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BIENNIAL REPORT
OF THE
INSPECTOR OF MINES
OF THE
STATE OF MONTANA
FOR THE YEARS
1905-6

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STATE DOCUMENTS

BIENNIAL REPORT

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INSPECTOR OF MINES

OF THE

State of Montana

For the Years

1905-6

WILLIAM WALSH, Inspector.

WILLIAM ORUM, Deputy Inspector.

DECEMBER 1, 1906

"INDEPENDENT PUBLISHING COMPANY, HELENA, MONTANA."



Office of
State Inspector of Mines.

Helena, Mont., December 1st, 1906.

Sir:—I have the honor to herewith submit my biennial report for the years 1905-6, complying with the law requiring reports from state officers, and making the sixteenth report of this department.

Respectfully,

WILLIAM WALSH,
State Inspector of Mines.

His Excellency, Joseph K. Toole,
Governor of Montana.

INTRODUCTORY.

Though the fall of snow during the past two winters, and the precipitation of moisture during the following summer seasons was unusually light, causing a shortage in the water supply that is so necessary to placer and gold mining, and other retarding causes, the mining industry of Montana has experienced a period of unusual prosperity and unequalled growth during the years 1905-6, the production of metals being much greater than during any similar period of the state's history, and approximating in value the entire agricultural and stock product for the same time.

There has been no time in the state's mineral development period, when so much interest has been evidenced and such large aggregate sums of money have been expended in prospecting and in the development of prospects, as during the past two years. The opinion of the east as to the general mineral resources of the state, as to the reliability and richness of her precious and useful mineral lodes seems to be much more favorable and confident now, than it has been in the past, and as a consequence prospects and partly developed mines of merit have not found it difficult to interest eastern capital in their complete and successful development.

The first necessity to the development of a mineral section is the energetic prospecting of the surface in order to locate the lodes or veins. This work is seldom engaged in by mining corporations or by men of means, and necessarily devolves upon the "prospector," so that upon him in the future, as in the past, the state must depend for the original discovery of leads that are later with the application of energy, knowledge and money, to develop into producers that will constantly add to the wealth that is pouring from the mines of the state. This continued prosperity and expansion of the mining interests of the state, is, however, being greatly retarded by the Federal forest reserve regulations and management. The prospector is allowed to explore the ground within the limits of the reserves, and to make mineral locations under the state and federal laws. But when

treat the immense quantities of ore that is annually taken from the depths of the earth.

In the production of copper, Montana has left all competitors far behind. The managers of our magnificent properties are not disposed to be satisfied with inferior appliances any more than they were with a second place in the record of production, and it is largely due to their prompt adoption of modern machinery and the most advanced methods of operation, that the copper industry of Montana has made the state famous the world over. And being promptly up-to-date has not only been instrumental in the advertising of Montana as the greatest of copper producers, as it has enormously added to the dividends that are being paid by the copper mining companies of the state. It has paid Montana and it has paid the operators.

Great as has been the advancement of the mining interests of the state in recent years, the record made is but a harbinger of the more wonderful advancement that will be witnessed during each succeeding year, for the industry of mining in Montana is in but its infancy and is just burgeoning into a rapid and healthy growth.

In the majority of cases, mining camps are no longer isolated settlements that are remote from civilization and transportation facilities, the steel rails of the railroads having been laid to the very heart of the sections of busy operation, and the locomotive, in its service of helpfulness, has penetrated to the scenes of mining ambition and enterprise, linking the industry with the commerce of the country, and making it more profitable by placing its products within easy access of the artisan and manufacturer, and allowing the producer to freely enter the markets of the world.

The world's supply of copper comes from twenty-two countries the total output for 1905 being 1,543,980,480 pounds. This, at 17 cents per pound, is worth \$262,476,681. On the market basis now prevailing of 22 cents its value represents the enormous sum of \$339,675,705.60.

Of these countries the United States is by far the greatest producer of copper, in 1904 producing 54.5 per cent of the total world's supply. For the last eight years this country has furnished more than half the supply, and there is no probability that it will ever be deprived of this distinction. In 1905 Montana produced 314,750,612 pounds of copper, and this year produced

340,000,000 pounds, or more than 40 per cent of the total copper product of the United States. If the mines of Butte were to suspend operations for a single year, it would create a shortage in the copper supply of the world that would amount to a "famine."

The Butte district, containing the leading copper mines of the state, is limited to an area of about five by seven miles, but the veins developed have been generous in width and have contained large ore bodies carrying great wealth. The total production of the Butte district up to 1905 is estimated at \$700,000,000.

Butte is built upon the copper industry. Every business of whatever character derives its success, either directly or indirectly, from this splendid industry. The development of the mines of Butte has increased the population of the town during the past quarter century from 1,000 to a bustling city of nearly 75,000 people, and today the boast is made that it is the greatest mining camp on earth.

The Anaconda mine, one of the Amalgamated properties, is the most extensively developed and largest producer of copper of the many mines of Butte. It was originally developed and operated for its deposits of precious metals, the surface ores having carried gold and silver values, the copper indications not appearing until after the property had been developed below the 150-foot level. As deeper development was secured, enormous bodies of rich copper ore also carrying good values in gold and silver, were discovered. The Anaconda company also owns the Modoc mine, in which, it is stated, there are millions of tons of copper ore in sight that runs but $1\frac{1}{2}$ per cent in copper. It is predicted that with the perfection of concentrating machinery such ore bodies will be extracted and treated at a considerable profit.

The Boston & Montana company has some exceptionally rich mines and these have contributed to the continued prosperity of the company during the past years. During the fifteen years of the corporate life of this company it has distributed large dividends to its stockholders. The group of mines owned by the Boston & Montana company rank as amongst the most highly mineralized of any copper veins that have ever been opened in any part of the world.

The holdings of the Butte Coalition company that recently took over the properties of the United Copper company, are

regarded by the owners as being amongst the richest mines of the district. The present output of these mines is 1,500 tons per day, the ores being treated at the Washoe smelters at Anaconda. Deeper development is proving the ore bodies to be very extensive.

The North Butte Copper company, a recent organization, is now the second largest copper producer in the Butte district, the ores being produced at this time carrying values that are nearly double that of any other neighboring mine, and with the treatment of its output at the Washoe smelters, is credited with producing copper for $3\frac{1}{2}$ cents per pound less than its most favored competitors. The output of the mines has been increased from 500 to 1,100 tons per day. The development and exploration now being carried on by this company is conclusively demonstrating the permanency of the mines and assuring the future of Butte and Silver Bow county.

There have been many new mining corporations and combinations organized over mining properties in Butte during the past year, and many of these have the most excellent prospects. The history of the North Butte Mining company has, however, been the most remarkable in the history of copper mining in the United States. It was fortunate in its initial steps in securing and combining a number of producing properties, the chief among which was the Speculator, enabling the company to immediately take rank among the producers, without having to go through the long and tedious wait of development, and it has improved every opportunity afforded by its properties by using only the most improved methods and equipping its mines with the latest machinery.

The claims of metallurgy have received a good deal of attention during the past year, and it is probable that the experiments that have been made by the Pittsburgh & Montana company in exploiting the ideas and inventions of Mr. Ralph Bagaley, will finally prove to be of considerable value. The company's mines started producing in 1905 and have had a considerably increased output during the present year.

During the past couple of years, and especially during the present season development in the Butte district has secured much lower levels, and has demonstrated that in both extent and values, the ore bodies of the district are as good in the lowest as in the higher levels. Exploration by diamond drill has also

secured great depth and with the same results demonstrating that the copper mines of Butte will continue to be great producers for many years to come.

The properties owned by Hon. W. A. Clark, situated at Butte, have been extensively operated during 1905-6, the output being reduced at the smelting plant owned by the company. The West Stewart and the Original mines are producing almost all the ore that is treated at these works, the production of the mines being about 1,250 tons a day. Of this output about two-thirds is concentrated and the balance, being first class ore, goes directly to the smelters.

The La France Copper company is another recent organization, taking over the Lexington properties, which it has developed to lower levels, opening up merchantable bodies of copper ore, and promises soon to become one of the regular and considerable producers of the camp. The properties had been worked years ago, but had been shut down for a long time.

In 1875 rich silver ore was discovered in Butte and some years afterward the first copper was taken from what is now known as the Parrot mine. In 1879 the Colorado Smelting company built a plant for turning out copper matte. In 1881 the first railroad reached Butte. A year later the copper production amounted to 9,058,284 pounds, and in 1883 this output had been doubled. Since that date the copper resources of the district have been developed at a wonderful rate, and it is estimated that up to this time the mines have had a total output of seventy million tons of ore that averaged five per cent copper. The ores of Butte carry their copper values in glance, peacock and sulphides, with gold and silver as by-products. The ledges of the Anaconda and Leonard mines are frequently as wide as 100 feet, and will average half that width, and the Syndicate lodes run in similar widths. It is of course, a fact that all the lodes of the district are not of such generous proportions, running from these widths down to small leads. In the earlier stages of copper mining in Butte the percentages of copper ran as high as 40 per cent, but such high grades were in most cases surface ore. At present the deepest levels in the leading mines will run from $2\frac{1}{2}$ to 8 per cent copper, with the accompanying silver and gold a valuable addition to the ore values. Butte mining is now practically all in the sulphide ores.

The low grade ores running from 3 to 5 per cent are treated by

the wet process and about one ton of concentrates is obtained from three or four tons of crude ore. Ores carrying from 10 to 15 per cent copper are smelted direct and turned into matte or reduced to pig running from 98½ to 99½ per cent copper and containing the gold and silver values.

The main fissures of the Butte district have an easterly and westerly strike, the ores occurring in distinct fissure veins. The formation is exclusively granite.

The new Washoe smelter at Anaconda is now treating the output of the Anaconda company, the Washoe company and the North Butte company. The plant has a capacity of 10,000 tons per day. These works were completed and put in operation during 1902, and are reputed to be the largest copper reduction and refining plant in the world. The great plant is located at Anaconda on a tract of 300 acres of land, so situated as to most conveniently receive its immense tonnage and discharge its daily output. The construction of the plant required a year and seven months, the great structure requiring twenty-five million feet of lumber, twenty thousand tons of steel and iron, fifty thousand yards of masonry and one thousand carloads of brick, in its erection. It was the original intention to erect a plant with a daily capacity of five thousand tons, but the capacity was doubled. The ore supply comes almost exclusively from Butte, being hauled by rail a distance of 27 miles. The ore bins at the mines are so arranged and are of sufficient capacity to load eight or ten railway cars at a time, allowing the hasty loading and making up of the trains. The Washoe smelting plant is a part of the property of the Amalgamated company. During the past year this company has used in its mines and surface work fifty-three million feet of lumber, this amount being exclusive of the round timbers and lagging used.

The Butte district is more prosperous to-day than it has been at any time in its history. There is more ore in sight in the mines than at any time in the history of the camp. Recent development has proved that the properties north of the city, which have always been popularly supposed to carry only gold and silver values, develop into copper mines when depth is secured, the opinions of mining engineers to the contrary notwithstanding. As an evidence of the limitation of the knowledge of men who have devoted the larger part of their lives to acquiring a familiarity with mines and mining, both

in their practical and theoretical phases, many instances have occurred at Butte and other portions of the state, where mines that had yielded generous profits to their owners for a number of years, suspended operations and were abandoned on the advice of reputable mining engineers, upon the ground of supposed exhaustion of the pay chutes. Later experience with a number of such abandoned properties has proven that expert judgment which consigned the mines to idleness was utterly unreliable. It is a fact that Butte has developed in spite of, during its earlier periods, the most adverse expert opinions. A prominent case in point is that of the Jay Gould mine, situated a short distance northwest of Helena. In mining circles this mine was supposed to have been worked out; but after a number of years of idleness, it was taken over by a company, and in three months of development work a large body of fine milling ore was placed in sight, and was soon opened to an extent warranting the establishment present the multiplicity, stability richness and advantageous operation since its installation. Other and similar cases have come under my notice.

Carefully compiled returns of the gold and silver output of the state for 1905 show the commercial value of the precious metals product to have been 14 million dollars.

It seems to this department that the mineral industry of Montana should receive encouragement and assistance both from the state and nation, at least to the extent of the establishment of an experimental mineral station such as those provided for the assistance of agriculture. The subject should be agitated until it secures a crystallization of public opinion strong enough to compel the establishment of such an institution either under the auspices of the state or general governments, or both, working in harmony. Our mineral resources are not receiving the scientific or the public attention they merit.

The old Alta concentrator at Corbin is again the scene of activity, it having been remodeled into an experimental plant for the concentration and treatment of zinc ores. The operations are being conducted under the management of Mr. J. D. Malm, who with Mr. John Maginnis and associates feel assured that they have a process that will successfully treat zinciferous ores. The experimental plant has a capacity of from 30 to 40 tons per day, and, if the process proves successful, the capacity will be in-

creased to 120 tons per day. The district immediately surrounding Corbin will easily supply the required amount of crude zinc ores.

Though it is a regrettable fact that Montana in the past has done little or nothing, either in individual or concerted action, to present the multiplicity stability, richness and advantageous environs of her unequalled mineral resources, it is nevertheless a fact that, during the past two years, and especially during the past year, there has been more seeking after Montana properties and more money has gone into the purchase and equipment of mines and the development of prospects, than during any period of double the length in the past, and the indications are that the coming year will witness much greater activity and a proportionately greater inflow of money that will go into mining investments.

It is safe to predict that if any competent effort should be made to bring the state's great mineral resources to the attention of the investing world, the next five years will experience more mining development and a consequent greater addition of established and producing wealth, than during all the previous history of the state.

The state has safer and better mining opportunities to offer capital seeking this line of investment than has any similar mineral area of the continent. The mineral zones of Montana are distinctly delineated, the lodes are largely true fissures cutting granite or slate formation, and are from small to the most generous width, and they are productive of unusually high grade ores. It may be said that the mineral districts of Montana, notwithstanding the state's great annual output of precious metals and commercial minerals have not as yet been prospected, much less developed. Aside from the small area covered by the older Butte mines, and a single mine here and there throughout the state, there is no deep development anywhere; but every mine in the state that has secured depth, has improved its ore values as it went down and is still producing, and every mine that is producing in shallow workings finds increased values with every added level. The mineral lodes are stable in formation and in the continuity and values of their ore bodies.

Though it may not be the popular impression with residents of non-mineral bearing states, it is a fact that mining is one of

the safest lines of business investment. This statement must, of course, be qualified by saying that mining is safe and not more speculative than most other industrial ventures, provided the investor uses experienced judgment in the selection, development and working of the mine. Nearly every mining failure made in this state and with which this department is familiar, has been caused by these conditions: the property to be developed is placed in the hands of a manager who does not know the first thing about mining or the developing of a mine, or, if this is not the case, after a small amount of development is secured, and not enough to at all demonstrate the property, the supply of money is stopped on the theory that the property is a failure because it has not produced ore from the grass-roots. But where a good prospect is selected and the development is placed in charge of a competent person and he is supplied with sufficient funds to properly develop the property, there are not as many chances of failure as there are in a great many of the other industrial ventures that are reckoned as safe investment by capital.

This department is constantly in receipt of inquiries as to the minerals, the mineral resources of Montana, and for particulars as to opportunities for investment and any encouragement would greatly increase these applications; but as this department is occupied only by the writer and his deputy, both of whom, in complying with the law that compels at least one visit to each mine in the state during each year, are kept more than busy, the office not even being granted an office assistant, it is impossible to give such correspondence the attention it should, for the benefit of the state, receive.

With some systematic and intelligent publicity, the development of the mineral resources of the state could be made to advance with leaps and bounds, and in a few years would add tremendously to the wealth of the state and to its annual income.

During each year the state capitol is visited by thousands of people from without the state and while they are on their round of sightseeing, there is little matter or collected information on hand to give them that would enlighten them as to the mineral resources of the state, and there is practically nothing to show them in the line of samples from the many ore-bearing areas of Montana. If this department was given the means, it could, in the course of a couple of years, place specimens on display from

every mine and from every district of the state, and these would of themselves tell the most convincing story of the opportunities there are for the opening of mines and the creation of profit-making industries in this line.

To properly present the mineral resources of the state there should be reports made on every district, not only covering the developed or developing mines, but upon the whole mineral section, giving full information as to its formation, the character of its leads and veins, the character of the ores and the surface and developed values, and specimens in all their varieties should be on display.

As the writer is penning this paragraph, he has received a call from one of the largest cement manufacturing concerns of the east, who is in quest of information relative to the deposits of this state, and the only information the department has on the subject is such general knowledge as has been picked up and which is of no value to the practical man looking for facts. There are some great cement deposits in the state, but not having inspected them and having no samples from them, we have nothing of value to offer the inquirer.

If the suggestions made could be carried out with intelligence and completeness every dollar it would cost the state would be returned one hundred fold. The Treasure State can only be made to open its vaults and pour out its wealth by inducing outside capital to become invested in constructing tunnels to the doorways of the treasure.

The statutes of Montana insofar as they relate to the safeguarding of the lives and health of miners, as they are now amended, are reasonably good. The State Mine Inspector is authorized to make such recommendations as he may deem necessary to protect the lives and health of men employed in the mines and is given power to enforce compliance with every reasonable demand made. The laws are deficient, however, in that they do not specifically provide for the regulation of the ventilating and sanitary conditions of the mines, and I urgently recommend the passage of a law at this session of the legislature that will provide for the regulation of the ventilation and sanitation of the mines under the authority of this department. The laws now provide that the inspector or his deputy shall visit every mine in the state at least once during each year and inspect the

workings, the timbering, means of ingress and egress, and ventilation; but the law should be more specific in regard to ventilation and sanitary conditions, prescribing the volumes of fresh air that must be provided those working underground, and that the workings shall be constantly kept in proper cleanliness. This is a necessity to the preservation of the lives and health of the miners.

In some of the mines in this state men can be found at work in places where it is difficult to make a candle burn in the dimmest way. When inspections are made and the conditions are found as described, the superintendent is notified to improve the ventilation. In many cases the order is promptly complied with; in others compliance is dilatory; in others it is disobeyed. If the laws prescribed the amount of fresh air that must be provided, then a simple measurement of the currents would positively demonstrate whether or not the proper amount of fresh air is being furnished and there would not be any room for disagreement as to the abundance of the supply, and in case of an insufficient supply, the prompt obedience to the order of the inspector for improvement, should be made compulsory. It is seldom that the betterments necessitated for the improvement of ventilation call for an extraordinary investment; but even in instances requiring a considerable expenditure, the money spent is well invested, as, aside from any moral or humanitarian considerations, it has been too often demonstrated that a man working underground in foul air, cannot accomplish as much work as the man laboring in a pure atmosphere, to allow contradiction, so that the improvement of the mine air that necessitates any considerable expenditure of money, is soon returned through the increased product of the men's labor. It will surely be allowed that the men who daily go down in to the depths of our mines and dig out the wealth that every day so enormously enriches the world, are entitled to have such provisions made for them as will at least to a reasonable extent contribute to the preservation of their health.

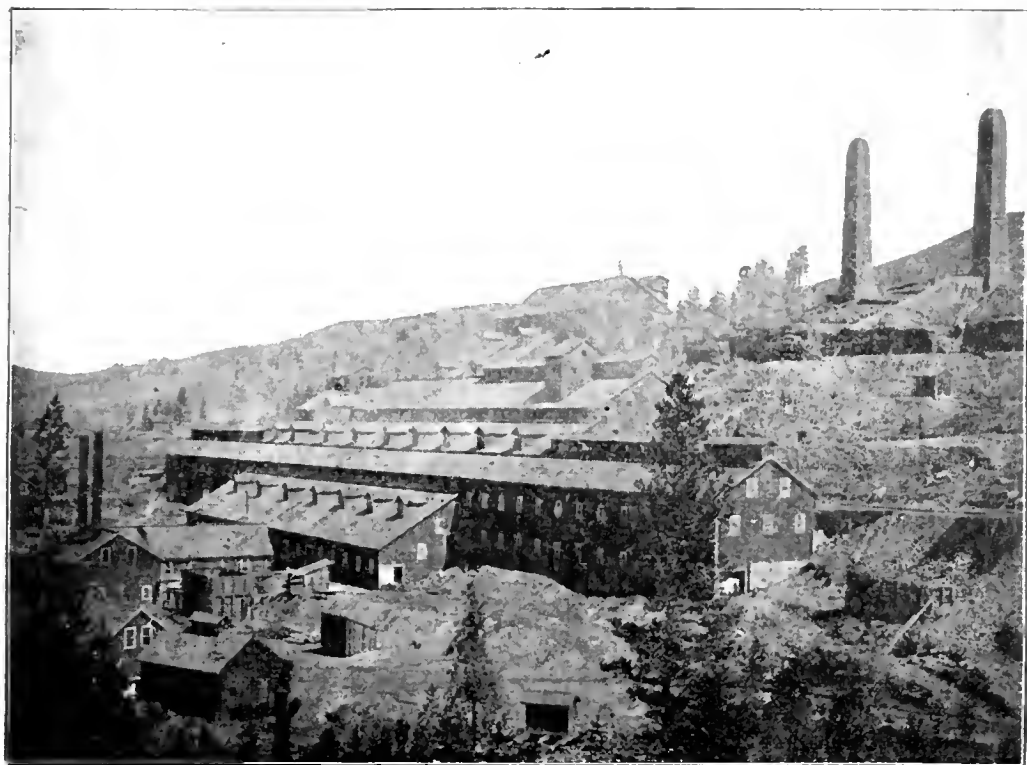
Placer Mining in the State.

The gross product of gold for the state for any particular year or for a period of years, is very difficult to secure accurately, owing to the many ways the metal that is obtained in native form is disposed of, the placer yield of the state since the discoveries of 1862 having run into many millions, much of which drifted into channels that finally found usage, without credit, in other state.

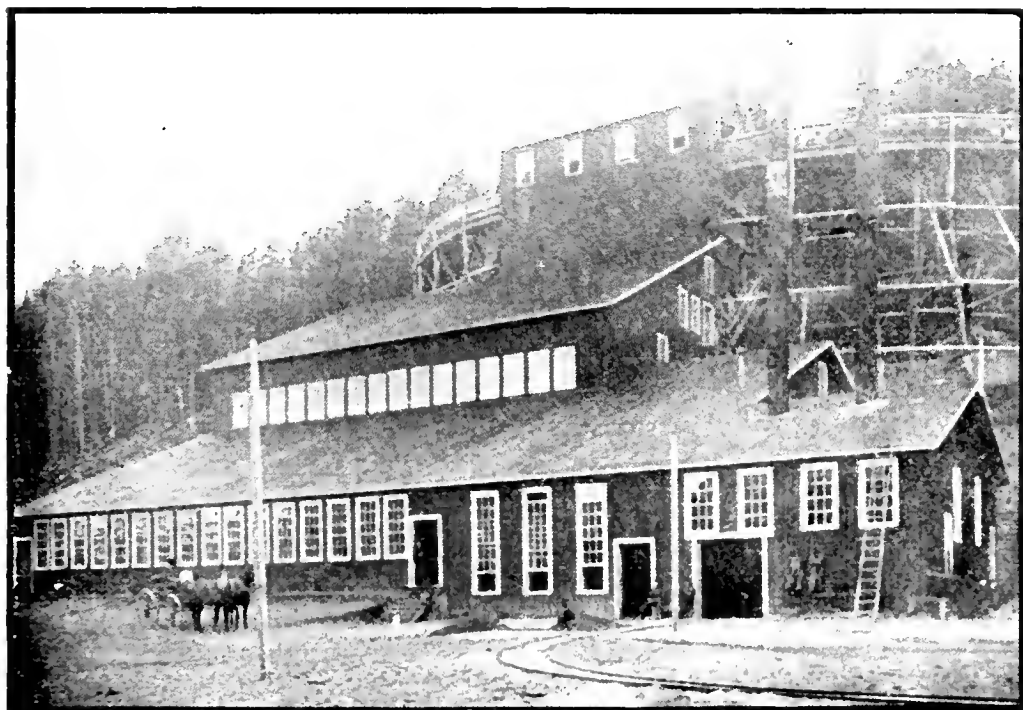
During the first years of placer mining in Montana, Madison and Beaverhead counties were the largest producers; later those of Prickly Pear gulch and about the same time Confederate gulch was noted as a producer of many millions. And but little later the placer gold was materially added to by the development of gold leads and the milling of rich ores in Lewis and Clark and Jefferson counties, which counties held supremacy as gold producers then for many years. In the later years, however, the development of gold leads became general throughout the mining counties of the state, and while, until the success of cyaniding brought Fergus county to the front as the banner gold producer, the counties mentioned held their place, the aggregate production of the state was very greatly enhanced and is being continually increased, and will increase with each year for a great many years to come.

As a whole, the gold deposits of the state show a decided analogy with those of the Pacific coast, with some marked modifications, and as a gold placer producer, the state stands second to California in the early-day history of its placer gulches.

The greatest placer wealth was produced from Alder gulch, Last Chance gulch, which now forms the main business street of the city of Helena; Confederate gulch; but many smaller gulches on both sides of the range, added many millions to the immense product of those mentioned. While but few discoveries have been made, these placers undoubtedly indicate the presence of quartz veins closely akin to the type of veins which chiefly occur in archern terranes, or in intrusive granite, there are some



BI-METALLIC MILL, PHILIPSBURG



BALD BUTTE MINING COMPANY'S MILL AT BALD BUTTE

normal gold quartz veins of the kind that are being worked throughout the state. This is especially true of Fergus and Chouteau counties, which have recently become the greatest gold producing sections of the state.

Considerable gold is now being secured with dredges, a number of the machines being in constant operation at different points in the state, Madison county presenting the most active field in this line.

There are many known rich deposits of placer gravel within the state that are dry and so situated that water cannot be taken to them without great expense, and these are lying idle waiting the perfection of a practical machine that will extract both the fine and the coarse gold with certain and ample profit.

Ventilation and Sanitation of Mines.

The necessity of good ventilation and sanitation of mines is strongly insisted upon by all authorities, and for two reasons: First, because it is demanded by every humane instinct; it is essential to health and longevity. Second, the economic effect in the matter of production cost of minerals, for which mining is conducted. The latter is greatly effected by the former, as it is obvious that the working capacity of the men employed must depend upon their sustained physical condition and the comfort with which their bodily exertion can be carried on. It is universally admitted that poor ventilation and sanitation are the causes of nearly all the ills that miners are subject to. The improvement in health that follows improved ventilation has been strikingly illustrated in several of the mines in the Butte district. These mines have made upraises to the surface for the purpose of discharging foul air and gases, with the result that the health of the employes has been noticeably improved.

The quantity of explosives used in Montana is much above the average in other mining states, and the gases from the combustion of these explosives are so intense as to seriously poison the air if the most abundant and constant fresh air currents are not maintained. Taking as a whole, the mines visited, the ventilation of the deeper levels and of development workings such as

drives, crosscuts, raises and winzes, cannot be said to be satisfactory, though those portions of the mines along the main air currents are fairly well supplied. Raises especially were often found to be very hot and the air much vitiated. Many of the long drives and crosscuts made for prospecting purposes, and not connected with the workings on higher levels, are also insufficiently supplied with fresh air and are correspondingly hot and uncomfortable. Considering the position of many of these drives and their length, in this district, the comparative purity of the air is remarkable. In many districts workings so situated would be dangerous to enter; a candle would not burn in them.

With very few exceptions the ventilation of Montana mines is obtained through physical mediums; the difference in temperature and height of the air columns in different parts of the workings. Whether this method proves satisfactory must depend upon a great variety of circumstances. In many cases the results are excellent; in others the results are not as satisfactory. When there are two shafts or main airways, through which a circulation of air is obtained from the surface to the deepest part of the mine and thence back by a different route to the surface, the resulting ventilation is generally good; but if the airways are small or are much obstructed, it will be very poor. The inspector regrets being obliged to report that the latter is by no means an uncommon condition.

Airways ought, at all times, to be of such size as to easily carry the necessary volume of air. Where there is only one opening into the workings, the shaft serving both as down-cast and up-cast, it is almost impossible to preserve good ventilation, as the air short-circuits from one compartment into another and very little of it goes through the workings. This phase of the question presents itself at most of the deepest mines, in their lower levels, and before these levels have been connected with those above them by raises and winzes, and in such workings the ventilation was often found to be far from satisfactory. Such places require that some mechanical means be employed; but aside from these there appears to be as yet no great difficulty experienced.

In ventilating all portions of our deepest mines by the so-called natural system, there is apt to be more or less difficulty from the fact that the direction of the air currents is often variable and dependent upon the other air columns in various parts of the mine and which are affected by dampness in places, heat in oth-

ers, the oxidation of minerals and by differences of temperature at the surface, on different days or seasons. It, therefore, frequently happens that the air currents flow one way, one day, and in the opposite direction the next day. Even main shafts are at times found to be down-casts and at other times are up-casts. This is particularly noticeable in places where the contour of the surface does not permit a sufficient difference in the altitude of the collars of the shafts. So it follows that there must be periods of longer or shorter duration between the reversal of the air currents, during which there is no circulation in parts of the underground workings, and in such portions this condition may continue long enough to become serious. There may also be local air currents circulating through certain sections of the mine, which simply go around and around, without being purified though cooled. This was found to be the case in some of the mines of the state.

Without doubt the best means of securing air through natural ventilation, is through the use of two or more separate shafts, one of which is an up-cast and the other a down-cast. When the workings of adjoining mines can be connected, an effect can be secured that will competently ventilate both properties. In the shallow portions of mines it is usual to have two shafts, but as greater depth is secured the workings are apt to become concentrated around a single shaft; if, however, the disposition is present, it is usually entirely practicable to have a second connection from the lowest workings to the surface, through winzes and worked-out ground, at a good distance from the main workings, and where these workings are sufficiently large and kept clear, they constitute an adequate air passage and have the same effect as a second shaft to the surface. It often happens, however, that air passages are much too small and that they are also used as ore and muck-ways and are allowed to become blocked. In every important mine there should be at least one air-way of large size, in addition to the shaft, and this should be kept unobstructed from top to bottom of the workings and used for the purpose of ventilation and travel only. In sections of mines where ventilation is defective, care should be taken to have several clear air passages from level to level. The system of using rearings, when filling stopes with muck, so as to leave a space between the filling and the unbroken roof, is commendable for air purposes as well as for all other well known reasons.

WINZES AND CONNECTIONS.

The construction of winzes to enable the ground to be blocked out and to locate passages as stoping proceeds, usually causes the ventilation to improve as the mine becomes better opened; but during the development period, before the connections are completed, ventilation is usually very defective. To minimize this unhealthy condition for the men, no time should be lost in making such connections. The levels should not be made too far apart and passages of some sort should be established at frequent intervals, as the nature of the work will permit. This is readily enough attained when the levels are in good ore, but when they are passing through barren ground, it is not practical to insist upon frequent connections. It is, therefore, impossible to lay down any hard and fast rules regarding the appropriate distances between levels or winzes, and discretion must be allowed the mine owner in these instances. In extreme cases mechanical ventilation is insisted upon, but if the ore development is at all extensive, it is usually economical management, in the long run, to sink a winze for the purpose of securing an airway that shall be independent of the main shaft. This air-way can also be used for travel by the miners and for a safeguard against fire, explosions or other accidents that not infrequently block the main passageways of escape. The winzes should be sunk simultaneously with the shaft, and driving from one to the other should be conducted with proper speed.

CONNECTIONS BETWEEN MINES OF DIFFERENT COMPANIES.

The question of connection between the mines of different companies, for the purpose of ventilation, is one that has a variety of aspects. There is no question that such connections bring great improvement to the mines that happen to possess a down-cast; and often also, to the one that has the up-cast; but there are cases where the latter may be detrimentally affected by receiving the smoke and vitiated air from the first. A mine that is itself well ventilated may reasonably object to becoming the up-cast for its neighbors. It is, therefore, largely a question of mutual fairness.

Cases have been encountered where the up-cast mine has been so seriously incommoded by its neighbor's communicated gases, as to necessitate the closing of the passage—and such action was warranted. At Butte there are a number of properties that have joint connections, and with the most beneficial results, though in some cases more or less hardship has been inflicted upon one party or the other. Generally speaking, the benefits have so far outweighed the detriments, and it is believed the practice should be encouraged. A winze or pass, made at the intersection at joint expense, would be one of the best solutions for not only ventilation, but of other difficulties.

The question as to when connections may be made compulsory, in cases where owners find it impossible to arrive at amicable arrangements, can hardly be the subject of a fixed rule, the circumstances of each case demanding separate inquiry and adjudication. An independent board to consider and settle such disputes, seems to be the best medium of solution.

APPLIANCES FOR REGULATING AIR CURRENTS.

Appliance for regulating air currents, such as the use of doors and stoppings, in systematizing the ventilation of metalliferous mines, has not had the attention which its importance deserves, the currents generally being allowed to travel at haphazard, and the smoke, gases and vitiated air from lower workings are consequently often found, when, by a little trouble the air currents could be diverted into a return-way, and in which they could do no harm. Each level should, as far as possible, be made separate, so that the air will be guided through the stopes above and thence into the main return. Frequently it is not practicable to make each level a separate split, and in these cases two or more may have to be worked on one split; but the more this principle of ventilating a mine in sections can be carried out, the more satisfactory will be the results. In any case, the inspector has insisted, even up to the point of working a hardship upon surface connections for ventilation. It may be observed that where such connections have been made by direction of this office, even though the operators demurred at the time of receiving the order, there has been general satisfaction in the end by reason of

the increased efficiency of the workmen, which in every instance will in comparatively short time pay the cost.

In order to overcome the indifference of mine owners to the health of their employes, the inspector will suggest that it would be but fair and humane to miners who have to work under specially distressing conditions, that the hours of their shift be reduced to six. Exemption from prescribed standards should, nevertheless only be allowed in development work prior to the completion of connections. It is believed that this would have the effect of causing better conditions, which, today, it must be confessed, are sadly neglected in spite of the fact that the very lives of men are dependent upon their betterment. In some cases the practicability of such improvement is perfectly apparent, if managers would but see it. Concrete instances have been observed and proven where absorbing efforts on the part of mine operators to increase dividends so far overshadowed their humanitarian interest in the employes, that both were sacrificed.

SANITARY CONVENIENCES.

In most of the larger mines it has been found that sanitary conditions are anything but satisfactory, in the opinion of the Inspector, and a number of them are positively injurious to the health of the miners. It is suggested, in this connection, that a tight zinc or iron box be made and placed on trucks so that it can be hauled about or placed in some abandoned crosscut or drift apart from the places of operation. The stool should be covered with airtight lids, and should be taken to the surface every day to be cleaned and disinfected. One of these boxes should be provided for every level of every mine over 500 feet deep.

The places where men congregate to eat their lunches has often been found to be foul from waste food thrown carelessly about and allowed to remain and decay. A metal receptacle should be provided for all such places and its use strictly insisted upon.

Where horses are used underground, the ways which they travel should be well drained and frequently cleaned, and the stable should be well ventilated and thoroughly cleaned. The stables should be placed near a return-way, so that the odors may not be carried through the working parts of the mine.

Levels used as travel-ways, or for the intake of air, should be well drained of stagnant water, and no water should be allowed to become pooled. Winzes and dams containing stagnant water should be slowly and carefully drained before work is resumed on them. In this way a sudden liberation of foul air from the water can be avoided.

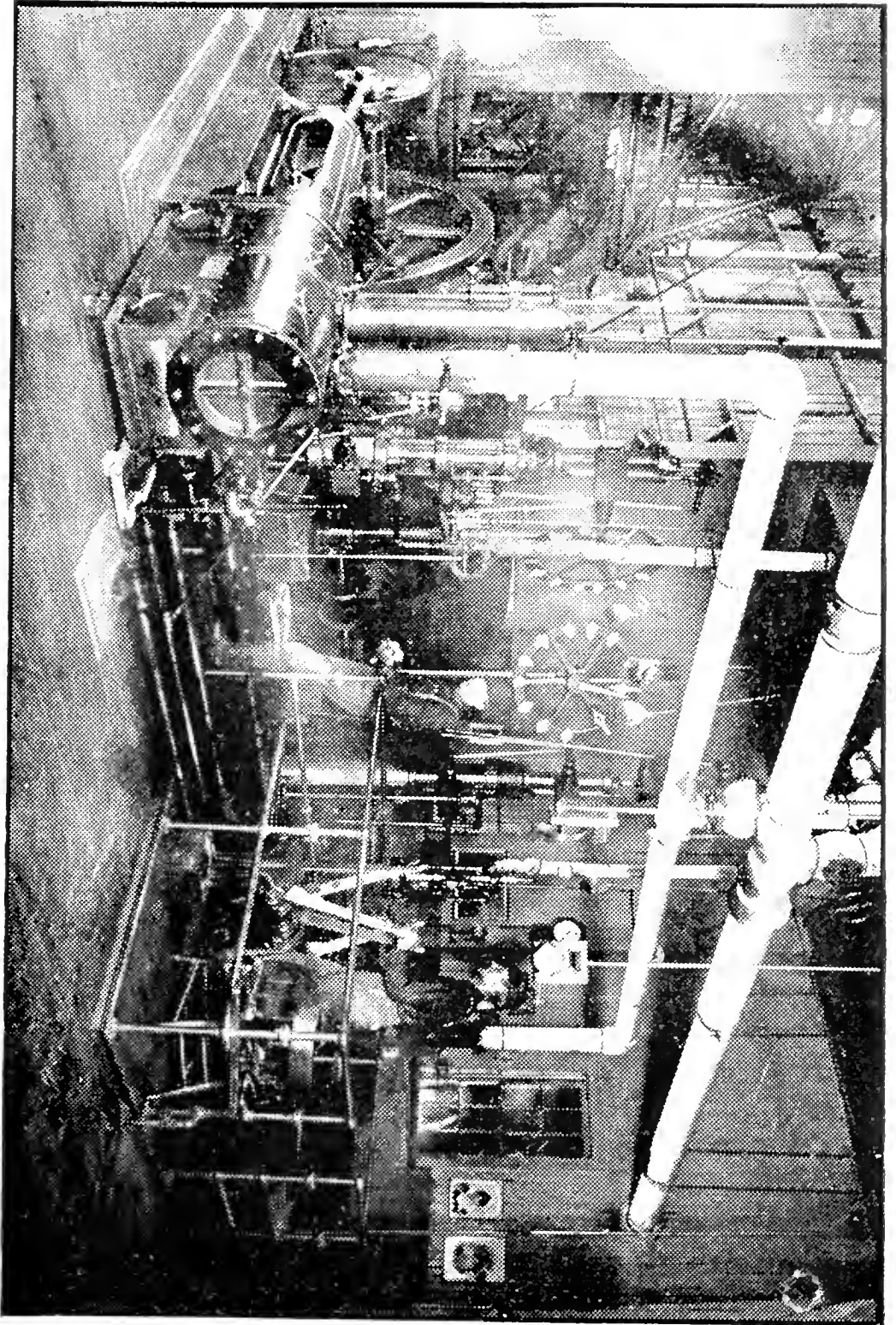
WHAT IS ADEQUATE VENTILATION.

The ventilation that may be necessary in mines in order to keep the air in such a state of purity as will enable workmen to maintain good health, depends greatly on environing circumstances, and these may differ greatly in every mining section of the state, and in instances will even vary in different parts of a mine. The single object of ventilation of a mine, is the prompt and continuous removal of the vitiated air and its replacement with a sustained supply of pure and fresh air; so the amount of ventilation necessary must in each case depend upon the amount of vitiated air removed and, correspondingly, the amount of fresh air necessary for replacement. When there is much blasting being done with heavy charges of explosives, or where there is much foul air emanating from the country, a much larger volume of fresh air supply is necessary, than is the case when little blasting is being done and when there is an absence of foul country air. And when the temperature of rock is high and the workings are consequently heated, it requires a much stronger current of air sent through them to reduce the temperature than is necessary when the rocks are naturally cold. So it is apparent that a fixed rule, declaring the volume of air that is adequate for a given mine unless placed so high that it will force the air into good places, or, in other words, forcing an unnecessary quantity of air into good places, in order to comply with a fixed rule that is based on what is required in bad places. If, for example an average amount of air is required for a mine, or group of mines, or a district, fixed under set regulations, the good parts of the workings will receive more air than is necessary, and the bad ones less than is needed, if the rule is strictly carried out. Therefore, it is apparent that rules governing the amount of air to be put into a mine, must be based on the condition of the mine's various parts,

and not on the number of men working in it, there being no necessary connection between the number of men and the condition of ventilation. When mechanical ventilation is employed, the supplying of an unnecessary volume of air becoming a serious item from an economic point of view, as the increase of motive power is not in proportion to the increased quantity of air. The condition to be attained is to put into the mine such volume of air, and to so distribute it through the workings, so that every place every man is working in shall receive an abundance of fresh air, every place receiving the air necessary to its individual requirements.

Carbon Monoxide from Powder Explosions.

In metalliferous mines the most common source of carbonic oxide, one of the most insidious and dangerous of all mine gases, in formidable quantities, is the imperfect explosion of dynamite used in blasting. In the perfect explosion of any of the various forms of dynamite or blasting gelatine, no carbonic oxide, or only a very small quantity, is formed. When, however, from any cause, such as unskillful handling, or defective fuses, detonators, or dynamite, the explosion is imperfect, and the dynamite partly burns instead of exploding, carbonic oxide and nitric oxide are formed in place of carbonic acid gas and nitrogen; and in such instances, beside the waste of time and dynamite, danger and inconvenience are caused. With good dynamite properly handled, the air of an "end" just after blasting ought not to contain more than small proportions of carbonic oxide, not exceeding more than a tenth of that of carbonic acid gas, and a higher proportion is indicative of some defect in either material or handling. Nitrous fumes arising from the accidental ignition of boxes of dynamite underground, have occasionally caused the death of a number of men. When there is any reason to suspect the presence of carbonic oxide in the air of any part of a mine, created either by faulty blasting, poor dynamite or the burning of wood in a poorly ventilated part of a mine, the condition of the air in such places should be very carefully investigated before allowing men to enter



HOIST ENGINE, EAST STEWART, BUTTE

it. The gas is odorless as well as colorless and is most insidious and treacherous in its effects. A man may breathe air containing a very small percentage of carbonic oxide for a considerable period without feeling any ill effects. The first inkling a man may have that anything is wrong, at least sufficiently to attract his attention will be a weakening of the lower limbs and palpitation of the heart, and when these symptoms of the poisoning become manifest, if he has to climb or make any effort to effect his escape, the probability is that he will find himself entirely incapacitated, being unable to make any energetic mental or physical effort.

NITROGLYCERINE COMPOUNDS USED IN BLASTING.

It will be noted by reference to the statistics, that during the past year there have been more fatal and serious accidents by the careless handling of nitroglycerine blasting compounds, than from any other single cause; and most of the accidental explosions of this powerful and concentrated force have been occasioned by the process of thawing or softening the explosive material. The grades of nitro compounds commonly used congeal at 40 degrees F., and in which condition they are not as apt to explode accidentally and are consequently much safer to handle; but in explosion when in this condition neither is the compound so effective. These preparations soften slowly at 50 degrees F., and should never be heated to a temperature beyond 100 degrees, and never, if avoidable, by dry direct heat, such as placing it in direct contact with a hot rock, stove or metal surface of any kind, or before an open fire where the temperature of the powder is apt to be raised suddenly. The safest way to thaw or warm powder is by steam or hot water radiators, in a room specially arranged, where the powder should be placed on wooden shelves that have no projecting nails or metallic surface, as nitroglycerine leaking from a case of powder and saturating the wood, is liable to be exploded by friction on the nail head or other exposed metallic surface. The safest way to thaw powder where only a small quantity is being used, is by warm water. There are several simple devices, usually in the form of water jackets surrounding a chamber containing movable drawers or shelves or pans, that are on the market. For any of these devices the water should

be heated to a temperature no greater than the hand can comfortably bear, and then filled into the jacket. When the manufactured convenience is not available, a fairly safe thawer can be made, suitable for thawing from twenty to forty sticks of powder at a time by building a solid, oblong box of two or three inch plank, with a close-fitting lid and adjustable shelves. The box should be deep enough to accommodate an ordinary five gallon oil can in the center, and long enough to provide for two tiers of wooden shelves, these being rested on cleats so as to allow their easy removal. The box should have a heavy and tight-fitting lid, and when in use should be thoroughly banked about with lirt. A box constructed and covered in this way will preserve the powder at proper temperature for a number of hours. The box, if being used in surface work, should be placed in an out-of-the-way place and not near any buildings; if, for convenience, it must be placed at depth in workings it should be deposited in a crosscut that is not at the time being used. The water of the box should never be heated with candles, this being one of the most dangerous customs and prolific in its disastrous results. Any thawing device of whatever kind, should be regularly and often cleaned so as to prevent saturation of the wood with the glycerine, as it renders wood cloth, paper or earth dangerously sensitive and liable to explosion by either heat or concussion.

SOME DONT'S.

The following "don'ts" may be profitably heeded by powder users. Some of these may appear superfluous to the lay reader, and may even be so classed by the careful miner; but from constant personal observation and experience, I know them to be worthy of strict observation.

Don't start to drill in a new face until you have thoroughly satisfied yourself that there are no missed holes or unexploded pieces of powder left in the old butts or cutoff holes. If such are found, reprime and shoot them before starting to drill, as a slip may connect or transmit a sympathetic concussion with the charge, sufficient to cause its explosion. This liability is greatly increased where machine drills are used.

Don't depend entirely on reports. It often happens that the

upper part of a charge will explode, while the lower part will remain, ready to explode with a subsequent concussion or increase of temperature.

Don't be in too big a hurry to get back to a burnt hole or "stinker," or to reprime a missed hole. It is safer to reprime, say, within an hour, than to work a half-shift over a hole that has missed fire. Missed holes will remain apparently dead for several hours, not showing the slightest sign of life, and then unexpectedly explode. Several cases of the kind have recently occurred in this state and with disastrous results.

Don't use any kind of metal tamping bar or tap. Use a wooden one when loading.

Don't carry a lighted candle in the same hand with powder or a capped fuse.

Don't keep caps and fuse in the same place with powder.

Don't store powder in the same room with oils or other inflammable matter.

Don't thaw or keep powder in a blacksmith shop or dwelling.

Don't jab too hard with a wooded tamping bar. In case a piece of powder fitchers or sticks half way in a hole, when loading, and you cannot push it home with gentle force, let the hole spoil, regardless of your reputation as a loader. If by so doing you should lose your position, you will at least have yourself left, and if you forced the loading you might not have that.

Don't carry powder about your person for the purpose of softening it, or attempt to thaw it with your candle, or crimp a cap with your teeth, or break a stick in two—cut it, no matter how dull your knife is; and if you have no knife, go and get one.

Don't jab a pick into a muck pile in the manner of striking a drill with a double-hand hammer. You are liable to hit a stray piece of powder that will explode with serious, if not fatal, personal consequences. Three or four such accidents have happened during 1905-6. Use your pick to work the material down, with a raking motion. It is much safer and just as effective.

Don't take a naked light into any warm storage place, or hand a candle over a box of powder or scattered particles of powder, or in making a hole for a primer when they are likely to strike a candle flame.

Don't carry loose powder in your arm; use a small sack that you can swing over your shoulder with a rope loop.

Old powder is dangerous to handle in many ways, and at the same time is hard to explode; in purchasing or receiving powder, always demand the fresh article and secure strong caps.

By practicing the above rules and by exercising ordinary care, little danger will be experienced in handling powder, and many of the accidents that are now so common will be avoided.

ACCIDENTS.

Much has been said, from time to time, upon the subject of mine accidents, their causes and prevention. Accidents causing the death of one or two men are of common occurrence; so common that they are regarded as a matter of course by the managements. It is true that a percentage of these accidents arise from carelessness of the men themselves, as, for instance, the most prolific source of non-fatal accidents is the fall of rock and the caving of ground, and which it is not always possible for the management to guard, the safety of the miner necessarily depending upon his own caution and judgment. It is impossible for the mine officials to visit every part of the mine during the first hour or more after a shift has gone to work, and during that period the miner should apply the first law of nature and protect himself by trimming down all the loose rock, and, if necessary, put in either permanent or temporary timbers, whether ordered to do so or not by the officials in charge. It also happens that when miners have used their own judgment in protecting themselves, as above advised, the foreman visits the place, inspects it, and decides that it was secure enough for the shift without the precautions taken, and generally reprimands the miner for the time he has, in the foreman's opinion, uselessly wasted. Both mining material and time are expensive, and the tendency to cut down cost is responsible for certain of the fatalities. The Mine Inspector is almost continually obliged to combat this tendency. For the man who does not protect his own life when left free to act, we can only have sympathy; but the cautious man who is working for the support of himself and those dependent upon him, is entitled to and deserves all the protection that can be afforded him by lawful requirement. In his behalf a mine inspector has been appointed, and whose duty it is to see that the miner is given such protection, and to guard against such practices as

may result in the loss of life, limb or health—and it may be said that the Inspector has endeavored to do his full duty in this respect. There are mines that have in the past been conducted in persistent violation of the protective laws, practically consigning men to death in order to increase the corporate dividends, and it has been one of the chief ambitions of the present incumbent of this office to carefully see that all the provisions of the laws relating to the safety of life and health of those engaged in labor in and about the metalliferous mines of the state, are rigidly observed, and there shall be no laxity in the future in this regard. In some instances the Inspector's instructions have been disregarded, and a second trip to the property has been necessary to compel compliance; but in the large majority of cases the suggestions, recommendations or orders from this department have been cheerfully complied with, and in some instances at very considerable expense; but in almost all cases the expenditures have been fully compensated in indirect ways. An important part of the mining laws of the state is in reference to the welfare of employes, and in their interest the following recommendations were made to the various managements and notices sent them during the years 1905-6.

1—In reference to timbering and timber	18
2—In reference to places for storing powder	10
3—In reference to quantity of explosives in magazines....	15
4—As to storing inflammable materials in houses and buildings covering the mouths of tunnels.....	8
5—In reference to apparatus for thawing powder.....	8
6—As to employing cage tenders who should have exclusive charge of cages	6
7—Regarding defective safety clutches on cages	10
8—In reference to defective hoisting cables	11
9—In regard to escapement shafts	13
10—Regarding the number of men who may ride on skips and cages	9
11—Forbidding riding on loaded cakes, skips and guckets....	5
12—In reference to the use of state mining signals.....	16
13—As to the use of gates when lowering and hoisting men...	7
14—For providing better ventilation	40
15—As to providing tunnels with separate connections to the surface, for escapes	9
16—As to leaving pillars of ground to protect shafts.....	13

17—Regarding the rate of speed in lowering and hoisting men.	12
18—For repairing and putting in ladders	22
19—In reference to crossheads	10
20—To providing railings around shafts, winzes and manways	18
21—In reference to finger boards	13
22—Regarding bulkheads damming water in mines.....	4
23—In reference to the filling of stopes to prevent caves—...	23

THE NUMBER AND CAUSES OF ACCIDENTS.

The following table shows the number of fatal accidents and their several causes, occurring during the year ending November 30th, 1905:

Explosion of blasting powder	15
Fall of rock or ground	9
Caught by cage in shafts	10
Falling down ore chutes	5
Falling down manways	2
Suffocated by gases or foul air.....	1
Breaking of cable	3
Struck by falling drills	3

Total fatal accidents during the year..... 48

The following is the number of non-fatal accidents, with their causes, which occurred during the year ending November 30th, 1905:

Fall of rock, or ground, or cave.....	25
Caught between cage and shaft	2
Premature blasts and explosions.....	7
Falling in chutest.....	2
Caught by car	1
Struck by falling drills	1
Struck by falling plank	1
Timbers slipping out of rope	1
Breaking of cable	1

Total non-fatal accidents for the year..... 41

During the year ending November 30, 1905, there were.

Mines inspected	186
Men employed	14,680
Fatal accidents	48
Fatal accidents to each 1,000 men employed	3.2
Non-fatal accidents	41
Not-fatal accidents to each 1,000 men employed	2.8

To the number of men employed, as above, 800 may be conservatively added to include the scattered prospectors who are working their own claims, and to cover those employed by the small properties employing from two to five men, and lessees, making a grand total of 15,480.

During the fiscal year ending November 30th, 1906, there were

Mines inspected	190
Men employed in mining	15,000
Fatal accidents	52
Percentage of fatal accident per 1,000 men	3.2
Non-fatal accidents	43
Percentage of non-fatal accident per 1,000 men	2.8

To the number of men given as employed in mining, 500 may be added as a conservative estimate of the miners who are engaged in the development of numerous prospects that have not been visited by the inspector, bringing the total of men up to 15,500.

The following table gives the number of fatal accidents, with the causes:

Premature explosions of powder	9
Fall of rock or cave of ground.....	20
Caught by cage in shaft	3
Falling down ore chute	9
Suffocated by gases	1
Falling of tank	1
Struck by crosshead in shaft	1
Rock falling down shaft	1
Falling off ore car	1
Struck by falling plank	2
Falling down shaft	2

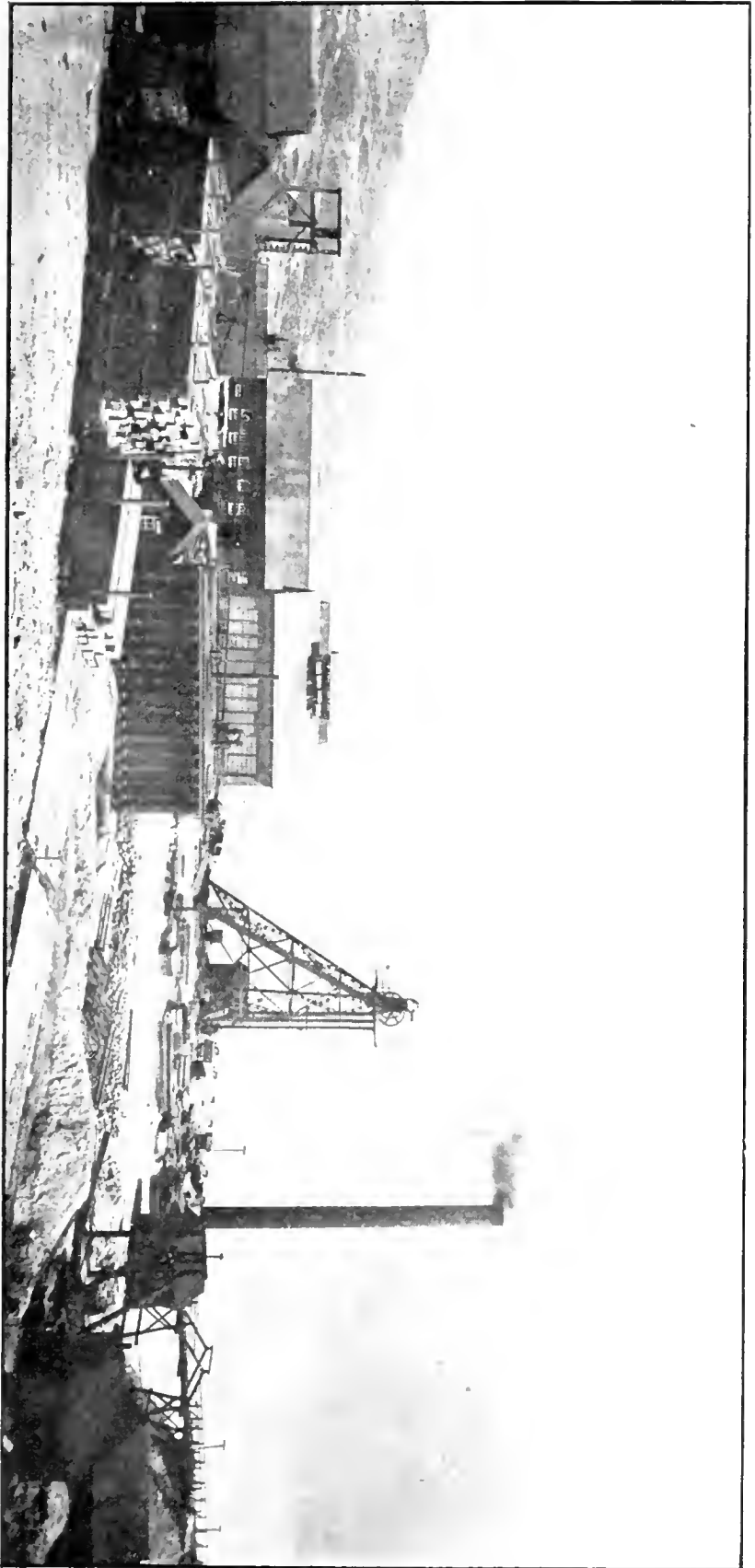
Struck in shaft by falling stull	1
Struck in shaft by bucket	1

Total fatal accidents during 1906..... 52

The following is the number of non-fatal accidents, with their causes occurring during the fiscal year 1906:

Fall of rock or cave of ground.....	25
Falling in ore chute	7
Caught by sheave wheel	1
Falling down manway	1
Premature blasts	2
Mine car jumping	1
Falling down shaft	1
Falling in skip chute	2
Premature explosions	3

Total number of non-fatal accidents for the
year 1906 43



SPECULATOR MINE, BUTTE

Mines Inspected, Men Employed, Accidents and Percentages.

The following table gives the number of mines inspected, the number of men employed, and the fatal and non-fatal accidents in the metalliferous mines during the past fourteen years:

Years,	Mines Inspected,	Men Employed,	Fatal Accidents,	Non-fatal Accidents,	Total Accidents,	No. Fatal ac- cidents per 1,000 men,
1893	53	8,312	29	4	33	6.45
1894	78	7,082	27	19	46	3.81
1895	88	8,758	41	18	59	4.67
1896	78	7,727	64	21	85	5.15
1897	130	9,825	52	29	81	5.50
1898	136	11,096	48	29	77	4.22
1899	165	12,316	49	22	71	3.97
1900	163	13,396	47	35	82	3.96
1901	157	12,078	35	33	68	3.
1902	169	13,784	47	45	92	3.41
1903	168	14,175	39	50	89	2.74
1904	176	14,480	41	55	96	2.83
1905	186	14,686	48	41	89	2.83
1906	190	15,000	52	43	95	3.2

To the men employed for 1906 may be added 500 who are scattered over the state working their own prospects and are employed as easers and in numbers from two to five with small mines making the grand total for this year 15,500.

FATAL AND NON-FATAL ACCIDENTS.

NON-FATAL ACCIDENTS, THEIR NATURE AND WHERE OCCURRING, FOR THE YEAR 1905.

Date	Name	County	Mine	Cause.
Mar.	3 Sampson, William	Fergus	Earnes-King	Shoulder crushed by fall of ground.
Mar.	10 Shannon, Thomas	Jefferson	Liverpool	Shoulder broken by fall of ground.
Mar.	17 Hughes, Ed.	Lewis & Clark	Jay Gould	Lost an eye by drilling into missed shot.
July	2 Panks, George	Lewis & Clark	Jay Gould	Injured by premature blast.
Mar.	17 Coffe, Charles	Madison	Toledo	Shoulder broken by being caught between skip and shaft.
Mar.	16 Reames, E. M.	Silver Bow	Pacific	Injured by fall of ground.
Dec.	23 Coleman, Dennis	Silver Bow	Anaconda	Leg broken by fall of rock.
Jan.	7 Davy, Dick	Silver Bow	Original	Leg broken by fall of rock.
Jan.	8 Stapleton, William	Silver Bow	Grey Rock	Leg broken by fall of rock.
Feb.	24 Dolan, John	Silver Bow	Anaconda	Leg broken by fall of rock.
Mar.	3 McKellap, Alex	Silver Bow	Diamond	Leg broken by fall of rock.
Apr.	6 Lextico, Chris	Silver Bow	Gagnon	Leg broken by fall of rock.
Apr.	16 Ragan, Jack	Silver Bow	Minnie Healey	Leg broken by being caught between wall plate and bonnet of cage.
Apr.	21 Williams, Fred	Silver Bow	Gagnon	Injured by premature blast.
Apr.	21 Buckley, Lou	Silver Bow	Gagnon	Injured by premature blast.
Apr.	24 Murphy, Dennis	Silver Bow	Anaconda	Leg broken by fall of rock.
May	2 Lemon, T. J.	Silver Bow	Moonlight	Leg broken by fall of rock.
May	12 McGillis, Hugh	Silver Bow	Cola	Injured by explosion.
May	3 Clapp, Thomas	Silver Bow	Leonard	Leg broken by fall of rock.
May	14 Erickson, Al.	Silver Bow	Pennsylvania	Leg broken by fall of rock.
May	14 Pearl, John	Silver Bow	Pennsylvania	Injured internally.
May	18 Kiley, Tom	Silver Bow	Anaconda	Injured by falling in chute.
May	27 Harrington, Con	Silver Bow	Neversweat	Leg broken by fall of rock.
May	23 Ruelie, Muck	Silver Bow	Pennsylvania	Leg broken by fall of rock.
June	11 Eberly, Con	Silver Bow	Anaconda	Leg broken by fall of rock.
June	12 Burns, Tom	Silver Bow	Neversweat	Injured by premature blast.
June	19 O'Neill, Martin	Silver Bow	Anaconda	Injured by falling in chute.
June	23 Brennan, William	Silver Bow	St. Lawrence	Injured by rock falling down shaft.
July	12 Harrington, Peter	Silver Bow	Anaconda	Leg broken by car.
July	22 Eastridge, Walter	Silver Bow	Gray Rock	Leg broken by fall of rock.
July	28 Robinson, William	Silver Bow	West Colusa	Leg broken by fall of rock.
Aug.	8 Socolovich, William	Silver Bow	Gray Rock	Leg broken by fall of rock.
Aug.	8 Rouch, Matt	Silver Bow	Cara	Leg broken by fall of rock.
Aug.	20 Lannan, Pat	Silver Bow	Neversweat	Leg broken by rock falling on it.
Sept.	9 Clark, Pat	Silver Bow	West Stuart	Injured by timber slipping out of rope.
Sept.	13 Tonney, John	Silver Bow	St. Lawrence	Leg broken by fall of rock.
Sept.	30 Anderson, Alex	Silver Bow	Pennsylvania	Leg broken by fall of rock.
Oct.	8 Calderwood, John	Silver Bow	Minnie Healey	Injured by parting cable.
Oct.	17 Crowley, James	Silver Bow	Minnie Healey	Leg broken by being struck by falling plank.

FATAL ACCIDENTS, THEIR NATURE AND WHERE OCCURRING, FOR THE YEAR 1905.

Date	Name	County	Mine	Cause.
May 18	Sabos, Stanley	Fergus	Barnes-King	Killed by fall of ground.
Sept. 1	Olson, John	Fergus	Gilt Edge	Killed by fall of ground.
Mar. 10	Nikender, Robert	Jefferson	Evay May	Killed by being caught in cage in shaft.
Feb. 26	Brauch, Harry C.	Jefferson	Liverpool	Killed by fall of ground.
Mar. 17	Wiseth, John	Lewis & Clark	Jay Gould	Killed by drilling into a missed shot.
July 21	Jobe, Fred	Lewis & Clark	Jay Gould	Killed by premature blast.
May 1	Young, William H.	Madison	Mammoth	Killed by picking into a missed shot.
June 20	Garnet, James	Madison	Mammoth	Killed by premature blast.
May 2	Knowlton, George	Madison	Toledo	Killed by fall of ground.
Dec. 1	McPherson, Hugh	Silver Bow	Gagnon	Killed by descending cage.
Dec. 6	Anoth, Angelo	Silver Bow	West Colusa	Killed by falling down minway.
Dec. 9	Coughlin, John	Silver Bow	Rarus	Killed by being struck with a falling drill.
Dec. 27	Squires, D. C.	Silver Bow	Red	Killed by descending cage.
Jan. 10	Cotter, Michael	Silver Bow	Diamond	Killed by falling drill.
Jan. 12	Barnal, Anton	Silver Bow	Pennsylvania	Killed by premature blast.
Jan. 13	Desjardins, Louis	Silver Bow	Rarus	Killed by descending cage.
Feb. 1	Greely, Thomas	Silver Bow	Rarus	Killed by the parting of cable on tank.
Feb. 11	Andrews, W. C.	Silver Bow	Rarus	Killed by falling in chute.
Feb. 19	Connell, Thomas	Silver Bow	High Ore	Killed by falling in chute.
Mar. 26	Oliver, Sam	Silver Bow	Anacanda	Killed by falling in chute.
Apr. 12	Kangas, Victor	Silver Bow	Parrot	Killed by premature blast.
Apr. 7	McGree, Owen	Silver Bow	Neversweat	Killed by cave.
Apr. 7	Brady, John	Silver Bow	Neversweat	Killed by cave.
Apr. 12	Kelly, Michael	Silver Bow	Diamond	Killed by cave.
Apr. 15	Walsh, Ed J.	Silver Bow	Anacanda	Killed by falling down manway.
Apr. 29	Mullins, Pat	Silver Bow	Mountain Con.	Killed by falling rock.
May 1	Powers, John	Silver Bow	Mountain Con.	Killed by falling cage.
May 4	Predmore, William	Silver Bow	Moonlight	Killed by fall of rock.
May 12	Hill, R. J.	Silver Bow	Cora	Killed by explosion.
May 12	Gill, David	Silver Bow	Cora	Killed by explosion.
May 12	O'Brien, Dan	Silver Bow	Cora	Killed by explosion.

FATAL ACCIDENTS, 1905—Continued.

Date	Name	County	Mine	Cause.
May 12	Warrappa, Nels	Silver Bow	Cora	Killed by explosion.
May 12	Houffman, John	Silver Bow	Cora	Killed by explosion.
May 12	Kramer, John	Silver Bow	Cora	Killed by explosion.
May 12	Hanley, Dan	Silver Bow	Cora	Killed by explosion.
May 15	Kiley, Martin	Silver Bow	Anaconda	Killed by falling in chute.
June 19	Shimmin, George F.	Silver Bow	West Colusa	Killed by fall of rock.
June 21	Dunaisch, John	Silver Bow	Rarus	Killed by fall of rock.
July 6	Rean, Pat	Silver Bow	St. Lawrence	Killed by falling cage.
July 22	York, Ed	Silver Bow	Minnie Healey	Killed by falling off of cage.
July 22	Crowley, Con	Silver Bow	Minnie Healey	Killed by falling off of cage.
Aug. 21	Kelly, Pat	Silver Bow	Anaconda	Killed by falling in chute.
Sept. 16	McKenna, Malcolm	Silver Bow	Speculator	Killed by falling in chute.
Oct. 6	Matti, Oscar	Silver Bow	Ararus	Killed by premature blast.
Oct. 6	Elliason, Frank	Silver Bow	Ararus	Killed by premature blast.
Oct. 8	Donohue, John	Silver Bow	Minnie Healey	Killed by breaking of cable on the sinking bucket.
Oct. 12	O'Neill, Ed	Silver Bow	Speculator	Killed by fall of ground.
Oct. 12	Endrizec, Eugene	Silver Bow	Speculator	Killed by fall of ground.
Oct. 14	Crawber, John	Silver Bow	Diamond	Killed by suffocation from powder gas.
Oct. 21	Kinsel, S. J.	Silver Bow	Mountain Con.	Killed by fall of rock.

NON-FATAL ACCIDENTS, THEIR NATURE AND WHERE OCCURRING, FOR THE FISCAL YEAR ENDING NOVEMBER 30, 1906

Date	Name.	County.	Mine.	Cause.
Mar. 21	Ross, Dan	Broadwater.....	Park	Loss of eye by explosion of powder in blacksmith shop.
Dec. 7	Boyle, Patrick	Deer Lodge.....	Cable.....	Loss of eye by premature explosion.
Dec. 1	Villeneuve, Alex.	Silver Bow.....	Gagnon.....	Leg broken by fall of rock.
Dec. 11	Crook, John	Silver Bow.....	Gagnon.....	Leg broken by fall of rock.
Dec. 11	Papoto, John	Silver Bow.....	Diamond.....	Leg broken by fall of rock.
Jan. 1	Sullivan, Mike	Silver Bow.....	Parrot.....	Leg broken by fall of rock.
Jan. 6	Harrington, Tim	Silver Bow.....	St. Lawrence.....	Falling in ore chute.
Jan. 17	Ivory, J. E.	Silver Bow.....	Gagnon.....	Leg broken by fall of rock.
Jan. 13	Sullivan, Paul	Silver Bow.....	Anaconda.....	Leg broken by falling in skip chute.
Jan. 18	Timmons, William	Silver Bow.....	High Ore.....	Injured by fall of rock.
Jan. 18	Nevil, John	Silver Bow.....	High Ore.....	Injured by fall of rock.
Jan. 20	Sullivan, Tim	Silver Bow.....	Anaconda.....	Cut in head by rock falling down manway.
Jan. 26	Livingston, Al	Silver Bow.....	Parrot.....	Leg broken by fall of rock.
Mar. 8	Sullivan, Dennis	Silver Bow.....	Diamond.....	Injured by fall of rock.
Mar. 12	Crugan, John	Silver Bow.....	J. L. C.....	Leg broken by fall of rock.
Mar. 12	Keir, M. S.	Silver Bow.....	Sp. culator.....	Injured by falling into chute.
Mar. 14	Barry, Joe	Silver Bow.....	Belmont.....	Hand caught in sheave wheel.
Mar. 21	Thomas, Jack	Silver Bow.....	High Ore.....	Leg broken by fall of rock.
Mar. 26	Lynch, John R.	Silver Bow.....	Bell.....	Injured by fall of rock.
Apr. 6	Loeffler, Stephen	Silver Bow.....	Pennsylvania.....	Leg broken by fall of rock.
May 1	Karpl, Andrew	Silver Bow.....	West Colusa.....	Leg broken by fall of rock.
May 31	Holm, Antonio	Silver Bow.....	Gagnon.....	Leg broken by fall of rock.
June 15	Fennel, —	Silver Bow.....	Parrot.....	Ankle broken by falling down manway.
June 17	Whitman, William	Silver Bow.....	Six O'Clock.....	Injured by premature blast.
June 17	Wyea, Swahn	Silver Bow.....	Six O'Clock.....	Injured by premature blast.
June 19	Wade, Frank	Silver Bow.....	Mountain View.....	Leg broken by falling down chute.
June 26	Reise, John	Silver Bow.....	Mountain View.....	Injured by falling down chute.
June 27	Dixon, John	Silver Bow.....	Pennsylvania.....	Leg broken by fall of rock.

NON-FATAL ACCIDENTS FOR FISCAL YEAR ENDING NOVEMBER 30, 1906—Continued.

Date	Name.	County.	Mine.	Cause.
July 1	Bennett, Joseph	Silver Bow	Anaconda	Injured by fall of rock.
July 16	Fitzpatrick, Patrick	Silver Bow	Never Sweat	Leg broken by fall of rock.
Aug. 11	Dolan, John	Silver Bow	St. Lawrence	Injured by falling in chute.
Aug. 23	Hoskin, Phil	Silver Bow	West Stewart	Leg broken by car.
Aug. 23	Carey, John	Silver Bow	St. Lawrence	Injured by fall of rock.
Aug. 23	Hughes, Robert	Silver Bow	Mountain View	Leg broken by falling in a chute.
Aug. 27	Price, Samuel	Silver Bow	St. Lawrence	Injured by fall of rock.
Aug. 28	Oates, William	Silver Bow	Anaconda	Leg broken by car jumping track.
Sept. 31	Miller, Joe	Silver Bow	Diamond	Leg broken by fall of rock.
Oct. 12	O'Rourke, Tim	Silver Bow	St. Lawrence	Back injured by fall of rock.
Oct. 13	Lean, Ernest	Silver Bow	St. Lawrence	Lost leg through fall of rock.
Oct. 17	Cauncey, J.	Silver Bow	Rarus	Leg broken by falling down shaft.
Nov. 5	Stafford, James	Silver Bow	Never Sweat	Leg broken by fall of rock.
Nov. 14	Neveaux, Geo. R.	Silver Bow	Anaconda	Leg broken by fall of rock.

FATAL ACCIDENTS, THEIR NATURE AND WHERE OCCURRING, FOR THE YEAR 1906.

Dates.	Names.	Counties.	Name of Mines.	Nature of the Accidents.
June 23	Duffy, John	Broadwater	Argo	Killed by car in the tunnel.
Aug.	Hughes, Peter	Broadwater	Argo	By an explosion of powder in the mine.
Jan.	Cushing, Mike	Deer Lodge	Cable	Premature blast.
Jan.	Harding, Charles	Granite	Tussell	Struck by bucket in the shaft.
Dec.	Lee nard, Henry	Jefferson	Serius	Struck by a falling stull.
Sept.	Veritas, Matt.	Lewis and Clark	Jay Gould	Falling down a chute.
Dec.	Cohn, Charles	Powell	Copper Cliff	Fell down shaft while lowering a pump.
Dec.	Madison, William	Silver Bow	Speculator	Fall of ground.
Dec.	Turk, Matt.	Silver Bow	Speculator	Fall of rock.
Dec.	Fitzgibbins, Geo.	Silver Bow	Mary Melane	Falling off tank.
Dec.	Jeffords, George	Silver Bow	Leonard	Fall of rock.
Jan.	Kennedy, Harry	Silver Bow	Pittsment	Fall of rock.
Feb.	Bein, C. W.	Silver Bow	High Ore	Falling off ore car.
Feb.	McCarthy, Steve	Silver Bow	Rarus	Struck by crosshead.
Feb.	Flemming, John	Silver Bow	Parrot	Struck by piece of lagging that fell down shaft.
Feb.	Finnegan, Pat	Silver Bow	Parrot	Falling in ore chute.
Feb.	O'Neil, James	Silver Bow	Hancock	Fall of rock.
Mar.	Finley, James	Silver Bow	Hancock	Struck by descending cage.
Mar.	McCauley, Robert	Silver Bow	Bell Mine	Fall of rock.
Mar.	Corcoran, Tom	Silver Bow	Anacoda	Struck by falling plank lagging.
Apr.	O'Brien, J. J.	Silver Bow	St. Lawrence	Fall of rock.
Apr.	Collins, William	Silver Bow	Never Sweat	Falling in ore chute.
Apr.	Duggan, Pat	Silver Bow	Mountain Con	Struck by splinter from guide.
May	Wicks, William	Silver Bow	Bell Mine	Fall of rock.
June	Hancock, J. J.	Silver Bow	Six O'Clock	Premature blast.
June	Lannan, John	Silver Bow	Six O'Clock	Premature blast.
June	Harrington, D. F.	Silver Bow	Mountain Con	Fall of rock.
June	Shea, Con	Silver Bow	High Ore	Falling in ore chute.
June	Howard, John	Silver Bow	Speculator	Falling in ore chute.
June	McGuire, John	Silver Bow	Butte and London	Falling down shaft.
July	Pagliari, Joe	Silver Bow	Speculator	Fall of rock.
July	Arrata, Nick	Silver Bow	Bell Mine	Fall of rock.
July	Clayton, Earl	Silver Bow	Speculator	Suffocated.

FATAL ACCIDENTS—Continued.

Dates.	Names.	Counties.	Name of the Mines.	Nature of Accidents.
July 26	Keen, E. J.	Silver Bow	Mountain Con	Fall of rock.
July 27	Evans, Ewen	Silver Bow	Gagnon Mine	Fall of rock.
July 27	Holt, W. H. Ford	Silver Bow	Pittsford	Fall of rock.
Aug. 3	Mitchel, Nathan	Silver Bow	Ophir Mine	Premature blast.
Aug. 27	Shea, Mike	Silver Bow	Bell Mine	Fall of rock.
Aug. 27	Antonivich, Fel	Silver Bow	Diamond	Falling in ore chute.
Aug. 30	Lyman, J. G.	Silver Bow	Bell Mine	Fall of rock.
Sept. 11	Strong, Al.	Silver Bow	Speculator	Fall of rock.
Sept. 15	Long, Howard	Silver Bow	Tramway Mine	Premature blast.
Oct. 11	Van Buren, Richard	Silver Bow	Rarus Mine	Falling in ore chute.
Oct. 17	Mealey, James.	Silver Bow	Belmont	Fall of rock.
Oct. 24	Finn, Andy	Silver Bow	J. I. C. Mine	Premature blast.
Oct. 24	Barrington, Ed.	Silver Bow	J. I. C. Mine	Premature blast.
Oct. 27	Axtell, Fred	Silver Bow	Speculator	Falling in ore chute.
Nov. 5	McGovern, James	Silver Bow	Never Sweat	Cave.
Dec. 5	McGee, Con	Silver Bow	Never Sweat	Cave.
Nov. 8	Fraser, John	Silver Bow	Colorado Mine	Rock falling down shaft.
Nov. 10	Lynch, Mike	Silver Bow	Moon Light Mine	Fall of rock.
Nov. 11	Beller, E. A.	Silver Bow	Butte and London	Caught by cage.

STATE CODE OF MINE SIGNALS.

Signal Bells.

- 1 Bell Hoist, 1 Bell Stop, (if in motion).
 2 Bells lower men, 3 Bells hoist men.
 4 Bells blasting signal engineer must answer by raising bucket a few feet and letting it back slowly.
 Then 1 Bell hoist men away from blast.
 5 Bells steam on, 6 Bells steam off.
 7 Bells air on, 8 Bells air off. 3-2-2 send down drills. 3-2-3 send down picks.

9 Bells danger signal, (case of fire or other danger) then ring number of station where danger exists. No person shall ring any signal bell except the station tender, except in case of danger, or when the main shaft is being sunk. Engineers must slow up when passing stations when men are on the cage.

Station Bells.

BELLS	PAUSE	BELLS	No. Station	BELLS	PAUSE	BELLS	No. Station
2	"	1	1	5	"	1	16
2	"	2	2	5	"	2	17
2	"	3	3	5	"	3	18
2	"	4	4	5	"	4	19
2	"	5	5	5	"	5	20
3	"	1	6	6	"	1	21
3	"	2	7	6	"	2	22
3	"	3	8	6	"	3	23
3	"	4	9	6	"	4	24
3	"	5	10	6	"	5	25
4	"	1	11	7	"	1	26
4	"	2	12	7	"	2	27
4	"	3	13	7	"	3	28
4	"	4	14	7	"	4	29
4	"	5	15	7	"	5	30

Where electric bells are used in connection with other bells. If cage is wanted ring station signal. Station tender will answer 1 Bell.

Reply 1 Bell to go up.

Reply 2 Bells to go below.

If station is full of ore and station tender is wanted, ring station signal and do not answer back.

2-1-2 Bells are rung, engineer or station tender does not understand, repeat signal.

In case of danger or accident, ring station signal, station tender will reply 1 Bell, ring 3 Bells.

One copy of this Code should be posted on the gallows frame, and one before the engineer.

THE STATE'S MINERAL PRODUCTION.

MONTANA'S MINERAL OUTPUT

Year	Gold	Silver	Copper	Lead	Totals
1890	\$3,300,000	\$70,363,636	\$16,656,437	\$675,397	\$10,995,435
1891	2,800,000	20,139,394	11,377,736	1,229,075	38,626,117
1892	2,891,386	22,472,323	19,105,661	990,035	45,469,208
1893	3,576,000	21,868,780	16,630,958	961,089	43,137,827
1894	3,661,110	16,665,158	17,233,718	731,561	38,191,547
1895	1,227,000	29,886,992	21,111,869	671,160	49,023,961
1896	1,380,671	20,321,877	25,356,541	676,110	50,722,099
1897	1,495,431	21,730,710	26,798,915	978,619	57,964,755
1898	6,217,913	19,159,182	26,112,616	807,650	51,312,067
1899	1,819,155	21,786,835	40,911,906	707,110	68,157,006
1900	1,736,225	18,482,241	39,827,135	701,156	63,746,757
1901	1,802,717	18,631,113	36,751,834	498,622	60,387,619
1902	1,400,095	17,699,225	21,606,048	332,719	46,961,167
1903	3,600,516	17,997,702	28,200,692	387,116	50,276,365
1904	5,097,186	18,887,227	36,110,310	195,525	60,990,818
1905	1,889,231	17,396,912	18,167,277	227,160	70,677,583

TOTALS, 1890 TO 1905.

Gold	\$296,117,370
Silver	121,499,190
Copper	498,493,035
Lead	13,878,250
Grand total	\$1,225,281,500

PRODUCTION OF GOLD AND SILVER IN MONTANA FOR 1905.

COUNTIES	GOLD		SILVER		Total Value
	Fine Ounces	Value	Fine Ounces	Value	
Beaverhead	122.671	\$2,555.83	48,172.81	\$62,284.04	\$64,839.87
Broadwater	5,842.861	120,782.71	51,859.92	70,930.00	191,712.71
Carbon and Meagher	75.600	1,592.79	9.26	11.97	1,571.76
Cascade	133.581	3,171.86	422.158.17	546,221.47	549,396.33
Chouteau	8,610.167	178,608.16	6,680.51	8,637.43	187,245.53
Deer Lodge	9,258.177	131,732.51	6,333.28	8,188.48	199,571.99
Fergus	60,839.267	1,258,179.12	2,580.17	3,335.98	1,261,615.40
Flathead	1,101.679	22,759.72	29,905.12	38,655.11	61,425.83
Gallatin	7,247.306	149,815.12	726,515.18	939,320.22	1,089,135.31
Jefferson	8,911.840	184,224.68	462,785.52	598,348.95	782,573.03
Lewis and Clark	30,660.111	633,801.36	170,112.12	220,330.80	854,132.16
Madison	36,406.900	752,598.45	135,231.90	174,815.28	927,413.73
Missoula	2,403.005	49,686.93	5,962.15	7,708.54	57,395.47
Powell	2,935.501	61,302.41	19,807.09	25,609.07	86,911.48
Park	3,437.811	71,035.94	1,268.71	1,640.39	72,706.32
Ravalli	403.218	8,335.26	67.68	86.63	8,421.89
Silver Bow	58,016.929	1,199,316.33	11,261,602.60	14,689,748.04	15,889,064.40
Totals	236,516.687	\$4,889,233.81	13,451,651.32	\$17,395,192.40	\$22,285,146.21

Beaverhead County.

The mineral resources of Beaverhead county are extensive in area, the broad zones traversing both sides of the Big Hole river and practically covering both ranges. The veins are highly mineralized and well defined, the general strike being southwest and northeast. The formation is principally granite. While the different localities have had a good deal of superficial prospecting, enough to demonstrate the fact that complete and deep development is fully warranted in many instances, there has been no exploration that has in any way revealed the mineral possibilities. But even with the surface development that has been accomplished on a few properties, several have become good producers and are having their product increase values as the workings go down. Most of the veins that have been explored to any extent are contacts and carry good values, usually running in gold, silver and copper. The principal mining districts are Bannock, Blue Wing and Elkhorn, in all of which good copper ore has been secured.

The following is the production of metals for 1904:

Gold, fine ounces, 2,055.662—\$42,494.30.

Silver, fine ounces, 34,639.71—\$44,786.69.

Copper, fine pounds, 63,815.

Lead, fine pounds, 84,844.

The following is the production of metals for 1905:

Gold, fine ounces, 122.671—\$2,535.83.

Silver, fine ounces, 48,172.81—\$62,284.04.

Copper, fine pounds, 114,600.

Lead, fine pounds, 174,009.

THE SILVER FISSURE MINING COMPANY.

The Polaris group of mines is located in the Elkhorn mining district, the mine being worked through a series of tunnels, No. 1 being 150 feet in length, No. 2, 200 feet, No. 3, 250 feet, No. 4, 330 feet, No. 5, 2,600 feet, 300 feet of this tunnel having been constructed during the present year. This tunnel secures 800 feet of vertical lead depth from tunnel No. 1 level, and is one of the best working tunnels in the state, being 8 feet wide and

7 feet high, in the clear, and costing in the neighborhood of \$45,000. The mine has been worked intermittently for the past quarter of a century, producing some very rich silver ore, running from 60 to 1,000 ounces to the ton. The company now has a large quantity of ore blocked out, and has about completed the construction of a smelting plant with four blast furnaces that will in the future handle the output of the mine. The machinery for the plant has been teamed in from Red Rock, a distance of 45 miles. The manager of the property is Mr. Harry Armestead and the foreman is Mr. Jamees Ford. The mine is at present employing 20 miners and 30 surface men.

THE CALUMET & MONTANA MINING COMPANY.

The Dark Horse mine is owned and operated by the Calumet & Montana Mining company, Mr. William Daniels being the manager, and Mr. William Duggan the superintendent and foreman, 12 miners being employed and seven surface men. The main shaft has two compartments and is down 130 feet, being timbered with 12x12 timbers, and equipped with a steam engine and round cable. The mine produces some very rich ore, one car having netted \$4,500.

THE BLUE-EYED NELLIE MINE.

The Blue-Eyed Nellie mine is operated by the Elkhorn Mining company, and is developed by a shaft that has attained a depth of 125 feet, 80 feet of the construction having been accomplished during the present year. The shaft is timbered with round timbers and equipped with a steam hoist and round cable. Mr. Frank Williams is the manager, superintendent and foreman, and is employing four miners and two surface men.

THE WASHINGTON AND PIONEER MINES.

The Washington and Pioneer mines are owned and operated by the Bannock Consolidated Mining company, Mr. William Dunn, manager, and Mr. William Matthews, the foreman. The

main shaft is 2-compartment and is down 200 feet, the sinking being accomplished during the present year. The shaft is timbered with round timbers and equipped with steam hoist, round cable and bucket. The claims lie above the placer diggings and have an ore body running from 3 to 4 feet in width carrying gold and copper values.

THE PARK MINE.

The Park mine is operated by the Park Mining company, Mr. W. F. Cobban being the manager, and Mr. Thos. Judge, foreman, six miners being employed, and two surface men. It is the intention of the company to develop extensively, and a two-compartment shaft is being sunk, the equipment being a steam hoist, round cable and bucket. The property has good surface indications, the croppings and surface ores running high in silver and copper.

THE IRON MOUNTAIN MINE.

The Iron Mountain mine is developed by a 700-foot tunnel, which, in the face has entered a body of rich ore. A shaft is being sunk, having been put down 100 feet during the present season, and will be continued to the 1,000-foot level, and extensively explored from the lower levels. Mr. Joseph Oppenheimer is the manager and Mr. H. J. McDaniel is the foreman.

THE NEW DEPARTURE MINE.

This mine is being worked through a series of tunnels varying in length from 200 to 1,000 feet. Ore is now being extracted from the lower tunnel and beside carrying good gold values runs as high as 300 ounces in silver. This mine has been worked at odd times for many years and has produced over half a million dollars net. The company intends to install a plant and sink on the ore, which, below water, runs from 150 to 200 ounces in silver. The manager of the property is Mr. Owen Best and the foreman is Mr. John March. Six miners and three top men are employed.

THE INDIAN QUEEN MINE.

This property is now being worked by leasers who are devoting their labors to the extraction of ore.

Broadwater County:

The mineral sections of Broadwater county are not receiving the attention of capital that they are entitled to. While mining has been conducted in the several districts for the past twenty years, there is not a single shaft, even in the Radersberg district, which is invitingly located for exploration, that is down over 300 feet; so it may be said that the mineral areas of the county are not even prospected either at special points or generally. Exclusive of such development as has been accomplished and the encouraging revelations it has made, the surface showings are fully equal to those of any mineral section of the state, and there is ample warrant for the prediction that when reasonable depth is secured great bodies of merchantable ore will be uncovered. The entire Radersberg district has a heavy capping of iron, which has not been penetrated, and the true worth of this section, and the wealth that lies within it, can not be estimated until this is accomplished. At a number of prospects three and four per cent copper has been secured with even the shallow development secured, and with depth undoubtedly much greater values will be revealed, and with proper development the camp will prove itself to be greater and richer than predictions have yet made it. The locality about Winston, on the Northern Pacific railway, has been the most active of the mineral sections of the county, during the past two years.

The following is the production of metals for 1904:

Gold, fine ounces, 6,194.488—\$128,051.43.

Silver, fine ounces, 56,391.58—\$72,910.32.

Lead, fine pounds, 388,698.

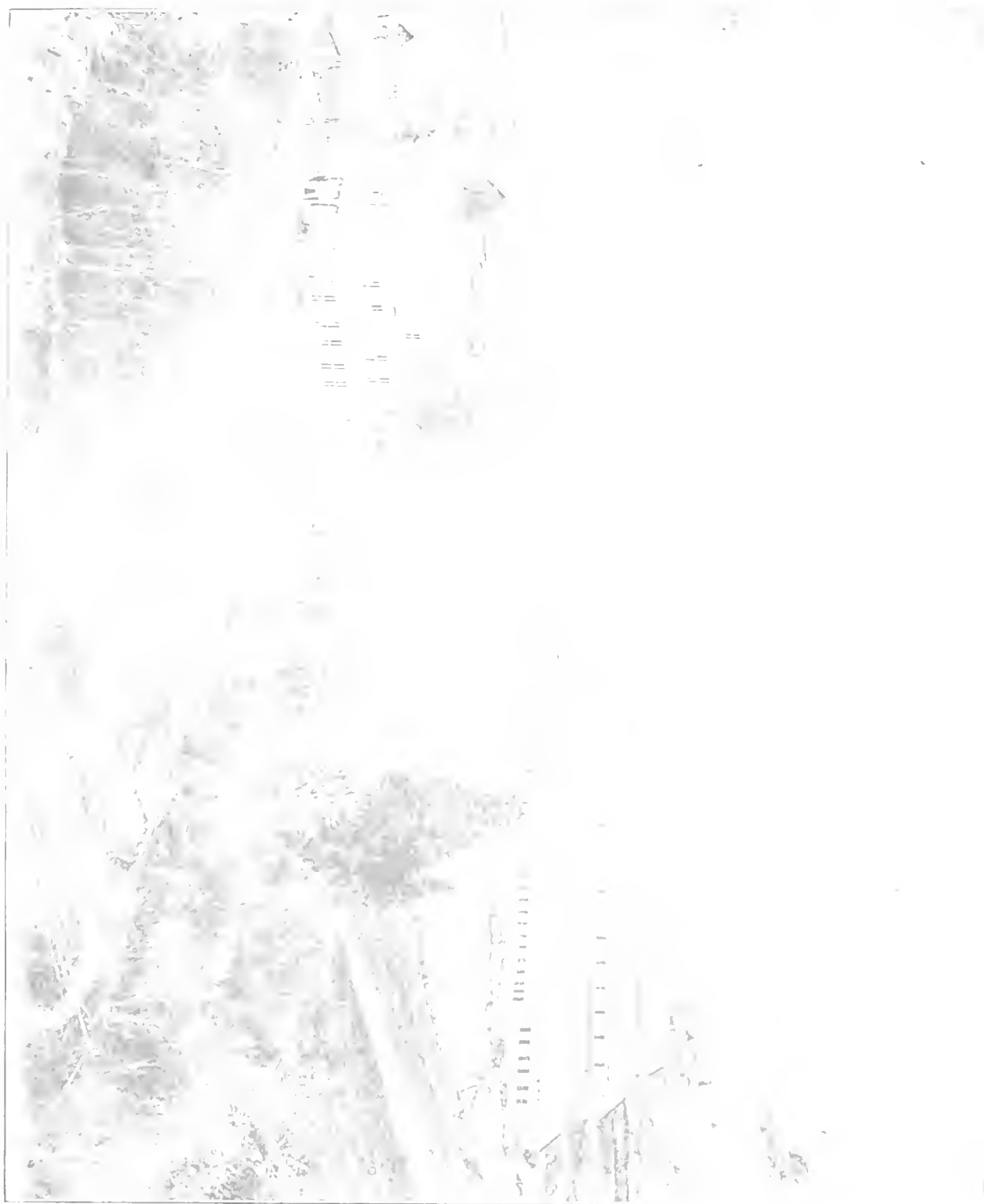
The following is the production of metals for 1905:

Gold, fine ounces, 5,842.864—\$120,782.71.

Silver, fine ounces, 54,859.92—\$70,930.00.

Copper, fine pounds, 63,414.

Lead, fine pounds, 529,559.





BI-METALLIC HOIST, GRANITE



WATSEKA MILL, ROCHESTER



THE CYCLONE MINE.

The mine is situated about four miles west of Radersberg and is owned by the Simpson Mining Company. Mr. E. F. Moore is the superintendent. The mine is operated by a tunnel that has reached a length of 550 feet, and a two-compartment shaft that has reached a depth of 250 feet and is equipped with a steam hoist. The development of the property has been pushed with vigor during the year and every proper precaution has been taken in the workings to provide against accidents and to protect the fifteen men who have been working in the mine. The ore is an iron sulphide carrying from \$20 to \$40 in gold, this being the principal value. Present shipments amount to 150 tons per month.

THE FREE COINAGE.

This property is located about two miles south of Winston and is owned by the Stephens Mining & Development company, of which J H. Quigly is the manager. The company has driven a crosscut tunnel 1,000 feet, encountering the vein at a vertical depth of 600 feet, and proving the width of the vein at this depth to be from three to five feet. The present savable value of the ore content is gold, the character being an iron sulphide. The work now being done is wholly in the line of exploration, demonstrating the number and permanency of the veins in the property, and in this work a vein carrying nickel, the first ever discovered in the state, was uncovered.

THE EAST PACIFIC.

The East Pacific mines are situated seven miles southwest of Winston, the property being owned by a corporation of that name, and of which Mr. R. A. Bell of Helena, is the president. The mines were in full operation during 1905, employing an average of sixty men. During that time a winze was sunk 150 feet and levels run on the vein east and west, the development made, exclusive of the winze, aggregating 600 feet. A station was cut at the location of the winze and the latter equipped with a

30-horse power hoist that is operated with compressed air. The mine is well timbered and is well ventilated by the natural system, having five exits to the surface. The lower tunnel is in 3,600 feet, securing a vertical depth of 600 feet. The principal work done in the mine during the year has been in the line of development, a crosscut being run from the lower tunnel level to cut a large parallel vein at some 400 feet of depth, and which it is anticipated will develop large and rich bodies of ore. The first class ore of the mine is a high grade galena carrying gold, silver and lead of about equal values. During last year a 100-ton concentrating plant was erected to treat the second-class ores and to work some 10,000 tons of this grade of ore contained in the dumps. The country formation is a diorite and the strike is east and west.

THE H. & H. MINE.

The property is located about two miles south of Winston and is owned and operated by the Custer Mining company, Mr. Charles Muffley of Helena, being the manager, and Mr. John Sucetti the foreman. About 100 men are constantly employed. The main shaft on the property has been sunk to a depth of 500 feet 200 feet of which was put down during 1905-6, and during the present year there has been 1,000 feet of drifting and cross-cutting done. The main tunnel, which is some 300 feet in length, has been connected with the shaft workings to provide ventilation and afford an additional exit. The system of timbering is square sets and stulls, and the stopes are well filled with waste, protecting the hanging wall. Beside the development accomplished during the year, much machinery has been installed, shafts repaired, the necessary manways between the levels and exits to the surface have been made, and the ventilation of all the workings is good. The property is equipped with a Ledgerwood steam hoist, 12x14; 7-8 inch steel cable, and single-deck cages with all safety appliances attached. The ore is an iron sulphide carrying gold and silver. The company is also operating the Higanthi mine, in the same group, where it has put down a two-compartment shaft to a depth of 270 feet, and equipped the shaft with a Ledgerwood steam hoist and single-

decked cage and round steel cable. The work being done here for the present is largely with a view to ascertaining the continuity of the ore body. Regular shipments are made to the East Helena smelters, and average about 900 tons per month. The veins in the group run from three to six feet in width; the country formation is diorite; the strike of the veins is east and west.

THE PARK-NEW ERA MINES.

This property is located about fifteen miles south of Townsend, in what is locally known as the Park mining district, and is owned by the Park-New Era Mining company, Mr. Allen C. Mason being the general manager and Mr. Sam Wisemiller, the foreman. Sixty-two men are employed. The property embraces fourteen claims and is worked through a series of tunnels, these being respectively, 1,300, 400, 300 and 1,350 feet in length. The latter is the lower tunnel, and from its breast a crosscut has been run to the vein and considerable drifting has been done, the work accomplished during the past two years aggregating over 3,500 feet. Beside the development work stated, upraises have been made for air and exits, and connections have been made in the workings at different points. The company is also doing a large amount of exploration work on other claims of the group. The workings are well timbered and ventilated and all precautions are taken to prevent accidents. The mines are equipped with all necessary machinery, including an air compressor of the Ingersoll-Sargent type and a 20-stamp mill, cyanide process, connected with the lower workings by a gravity tram, with a capacity of 75 tons per day. The ores are an iron sulphide carrying gold and some silver, those lying above the water level being treated in the plant through the cyanide process, and the base ores below water level are concentrated. The property has been operated constantly during the past two years with the exception of a short shut-down made to effect needed repairs in the plant. The veins are true fissures and run in width from three to five feet, and the values have increased constantly with depth. The country formation is diorite and porphyry, and the strike of the veins is east and west, dipping to the southwest at an angle of 55 degrees.

THE BLACKER MINE.

This property is located west of Radersburg and is operated by the American Smelting and Refining company of East Helena, Mr. F. M. Smith being the general manager of the company. John Mack is the foreman of the mine, which is now working twenty men. The property has a shaft 245 feet in depth that is sunk on a 65-degree incline, and the equipment consists of a Frazer & Chalmer hoist and a 3-4 inch cable. The company is installing machinery on the south shaft, which will be sunk an additional 200 feet, making the total depth of this shaft 450 feet. The country formation is diorite and the walls are very hard, requiring little timbering. The mine is well ventilated and has proper escapes. The ore is an iron sulphide carrying gold as a precious metal value, and runs from 35 to 37 per cent excess of iron, making the ore, aside from its gold values, valuable for fluxing. The mine now has a regular monthly output of 200 tons, which is shipped to the smelters at East Helena, and this capacity will be largely increased in the immediate future.

THE ARGO MINE.

The Argo mine is operated by the Eclipse Mining company, Mr. M. L. Sizer being the general manager and John J. Argo is foreman. The property is situated in Hell Gate mining district, about eleven miles east of Canyon Ferry. The property is operated through a series of tunnels comprising some 1,200 feet along the strike of the vein, which is east and west and a winze has been sunk from the lowest tunnel level a depth of 100 feet and exploration made therefrom to determine the extent of the ore body. The values in the ore are copper, and the ore is concentrated three-into-one at a 40-ton plant the company has erected on the ground. The ventilation of the mine is good, the workings being well connected with raises to the surface. Thirty men are employed.

THE ORPHAN MINE.

The property is located about four miles southwest of Winston and is owned by Mr. George Offel and is under lease and bond to Mr. M. T. Evens, who is superintending the work of development. An incline shaft has been sunk 130 feet and a drift has been run 125 feet east on the vein, which is a persistent and true fissure, which, in its course southerly will intersect a vein that runs at right angles to it. The hoisting is being done with horse whim. The ore is an iron sulphide carrying gold and copper, and shipments are being made. The formation is porphyry and granite. There are several well defined veins in the vicinity.

THE GOLD CROWN MINE.

This mine is located in the Cedar Plains mining district, three miles west of Radersburg, but is not in operation at the present time, though it was operated during the year 1905. There is a shaft 120 feet deep that was put down during that time, and from it several shipments of ore were made to the smelters at East Helena. Active operations will shortly be resumed.

THE RENO MINE.

The Reno mine is situated one and a half miles west of Radersburg and is owned by the Jewel Mining company, and of which Mr. William E. Jewell is superintendent. A perpendicular shaft has been put down during the year and the vein has been drifted on east and west. The ore secured is an iron oxide carrying good values in gold and copper. The strike of the vein is east and west and the width runs from three to five feet. The country is porphyry and the foot wall of the lead is diorite and the hanging wall granite. There are seven men employed on the property, and for the work done, it looks well. Shipments of ore are being regularly made.

THE UFF MINE.

The property is operated by Williams Brothers and during the year regular shipments of ore have been made. The ore is silver-lead and also carries gold values.

THE BLACK FRIDAY MINE.

The Black Friday group is located southwest of Radersburg and is owned by the Broadwater Mining company and is operated by H. L. Frank, C. A. Whipple and B. Rossman, the latter being the superintendent. The property was operated during 1905, but was recently shut down. The ore is an iron sulphide carrying high values in gold. The vein is a well-defined fissure.

THE HARD CASH MINES.

This group, consisting of six claims, is located four miles west of Radersburg, and is owned and operated by the Hard Cash Mining company, of which Mr. A. M. Easterly is the general manager. There are eighteen to twenty men generally employed on the property. The mine is worked through a series of tunnels, one being 1,730 feet in length and another 540 feet, both being run on the vein and connected for air and exits with upraises. The strike of the developed vein is east and west, and the vein runs from 5 to 12 feet in width. The country formation is granite and porphyry. Some very rich ore bodies have been exposed and large shipments have been made to the smelters, the ore running high values in gold. The mine is in fair condition both as regards timbering and ventilation.

THE GOLD KING MINE.

The Gold King property is situated at Hassel and is owned by the Edward F. Mining company of which Mr. Edward Bluette is manager and Mr. W. K. Ward, foreman. There is a two-

compartment shaft on the property that is now down 250 feet and is equipped with a 10x12 Ledgerwood steam hoist. Thirty-five men were employed during 1905 and the present year. During the year a 20-stamp mill has been erected that contains all the latest improvements and is a model in every way. Work in the mines was suspended for a short time, but will be resumed in the near future.

Cascade County.

The precious metal mines of Cascade county, as far as developed, are silver properties, and these lying mostly in the Neihart district, and though there are districts with promising gold and copper prospects, little development that assures their permanency has been accomplished. In the Neihart district the veins are distinctly silver bearing, and while the camp produced a large amount of ore and many fortunes of very respectable proportions were made before the slump in silver, since that time the great industry has lagged, the average market value of the commodity not warranting the expense of production. The outlook for the camp is now more promising than it has been for years, the advanced price of silver causing a number of the old mines that once made Neihart famous, to again become producers, and during the past year development and prospecting work has been carried on extensively and with renewed energy.

The following is the production of metals for 1904:

Gold, fine ounces, 7,647.104—\$158,079.67.

Silver, fine ounces, 249,380.80—\$302,431.74.

Lead, fine pounds, 1,472,155.

The following is the production of metals for 1905:

Gold, fine ounces, 153,584—\$3,174.86.

Silver, fine ounces, 422,468.17—\$546,221.47.

Lead, fine pounds, 830,410.

THE JOHANESBURG GROUP.

This group of seven claims is situated five miles west of Neihart and is owned by Nelson & Meetzger who are now doing some

extensive development work and opening up the ore bodies. A tunnel 100 feet in length has been driven on the vein and crosscuts have demonstrated the vein to be twenty feet. The values in this property run in gold, going from \$106 to \$550 in the richer samples of ore. The formation is granite and porphyry and the veins are well defined fissures.

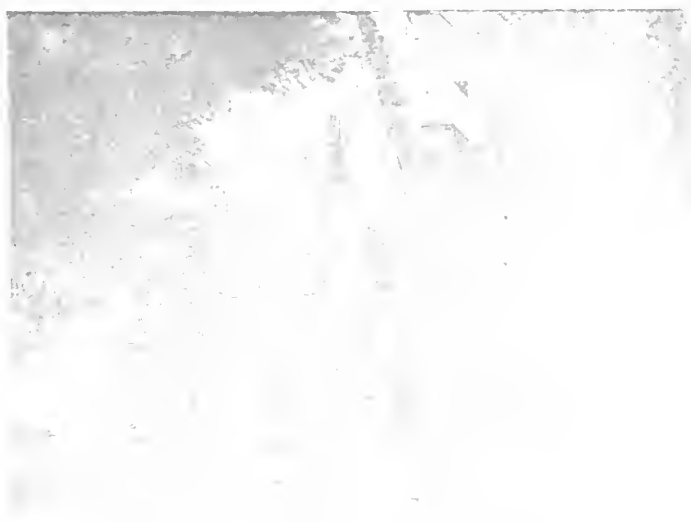
COPPER BELL.

The Copper Bell property is one of the many that have produced a fair tonnage of high grade silver-gold ore; but this property, like many others, has not been in operation since the fall in silver values, until the past summer, when the property was put in shape to again become a producer. Machinery for the operation of the mine has been installed and the vein has been tapped by cross tunnels in a number of places and at different levels, and these have revealed several very rich ore chutes. On account of the gold values carried in the ores of this property it is regarded as one of the best in the district.

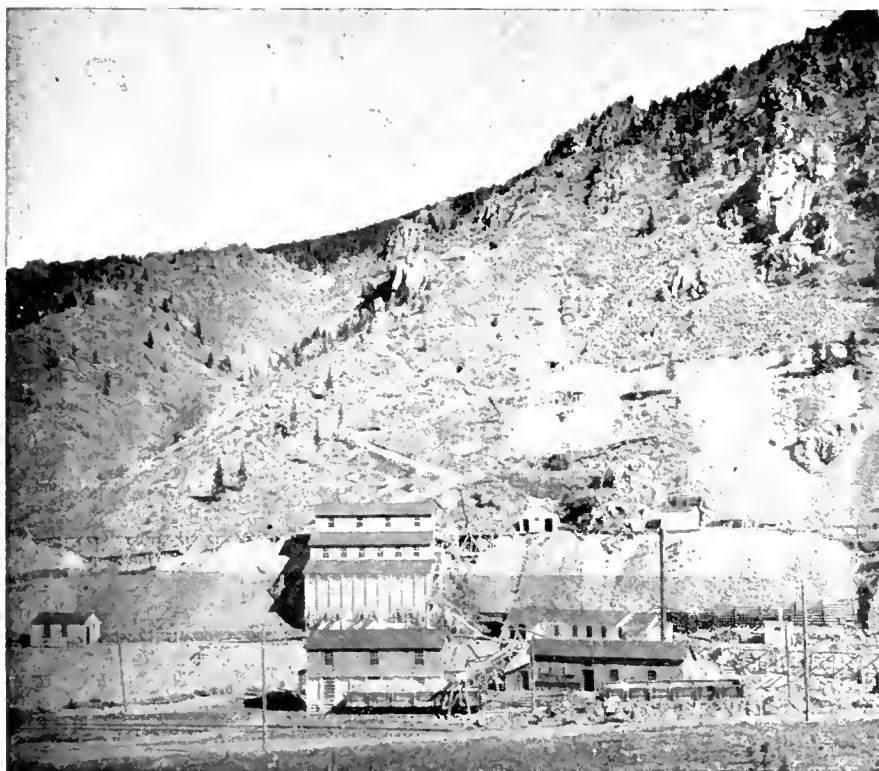
THE BENTON GROUP.

The Benton properties are situated seven miles northeast of Neihart, and are owned by the Benton Mining company, Mr. T. C. Power being the president and A. C. Gormley is secretary. Mr. Henry Tegtmeier is the superintendent. Owing to litigation this property has not been in operation for the past five years, but the preparations are now being made to open it up on a large scale, and the intermittent leasing that has been allowed will be discontinued and the mines will again be made steady and large producers. A tunnel 1,600 feet long has been driven to the lead which has been cut at a vertical depth of 800 feet, and has exposed some valuable bodies of ore. This lower tunnel is connected with other tunnels that are run on the vein higher up the mountain and all are connected to provide proper and necessary ventilation. The average width of the vein is from three to five feet, the strike is north and south and the dip is west. The method of mining is to break and fill. The com-

CONCENTRATOR AT NEIHART







FLORENCE MINE AT NEIHART

pany contemplates the construction of a large concentrating plant in the near future.

THE BIG SEVEN GROUP.

This property is owned by the Big Seven Mining company, which is owned by the Barker Bros. The group is now being operated under a lease and is making regular shipments to the East Helena silver smelters, the ore running as high as \$60 per ton in gold and 1,000 ounces in silver. From 12 to 14 men are working in the mines taking out ore. The mine is worked through a series of tunnels, the lowest of which is in on the vein a distance of 1,800 feet, and at the face has secured a vertical depth of over 500 feet. The next higher tunnel is in 800 feet on the same ore body. The vein is from four to five feet wide, the strike is north and south and the dip 55 degrees to the west. The country formation is granite and porphyry, requiring to be closely timbered to secure the ground. There are all necessary connections in the mine for safety and ventilation. The gold values of the ore are carried in iron pyrites. The company is now intending to further develop the property by driving a tunnel that will cut the ore body at a vertical depth of 1,200 feet, the work, in fact, now being under way. The country is cut by a porphyry dike and where this intersects the vein the values are largely increased.

THE LEXINGTON MINES.

This property is located west of the Big Seven group and is owned by Pearson & Harris and is now being operated under lease and making regular shipments to the silver smelters. Prospecting work is being done to ascertain the extent of the ore chute.

THE SPECAN CLAIM.

The Specan claim is owned by the Benton and Montana Mining company. The development consists of two tunnels driven in respectively about 325 feet. The property is operated under a lease and is making regular shipments of high grade ore.

THE FLORENCE GROUP.

This property is located immediately in the Neihart district, being but half a mile from the town. Mr. Daniel Lenny is superintendent and is now employing forty men in the mine. The property is being worked through tunnels that are respectively 1,100, 1,050, 800 and 200 feet, each of these affording a 100-foot level through the same ore body. The mode of timbering is square sets and stulls and the stoping ground is mined by the break and fill system making the hanging wall perfectly safe. The ventilation is perfect, the manways are in excellent condition, the levels are all connected and the escape shaft is in good condition from the lowest levels to the surface, making a strong and regular circulation of air throughout the mine. There is a shaft sunk 400 feet below the lowest level, which is equipped with a steam hoist, 7x10, Lane engine and $\frac{3}{4}$ -inch steel cable, a 300-gallon Knowles pump handling the water from the lower portions of the mine. The mine is in good condition in every department. Over 400 feet of development has been made during the present summer the work being done by drifting in the ore body. The strike of the vein is north and south with a dip of 65 degrees to the east. The formation of the country is granite and gneiss which is very hard. The vein filling is a quartz porphyry. The monthly output of the mine is from 180 to 200 tons of ore per month, which is treated at the East Helena silver smelter. The company intends to sink to the 500-foot level, enlarge the shaft and put in a skip. Every precaution has been taken to prevent accidents.

THE LONDON MINES.

The property of the London Mining company is situated one mile west of the town of Neihart and lies close to the railway. The property is leased by Roach Brothers and is operated under the superintendency of Mr. Paul Roach. Several tunnels have been driven on the lead running from 500 to 1,100 feet in length. During the past year a 150-foot upraise has been made, connecting the workings with the surface. Square sets and stulls are used in timbering. The ore is an iron sulphide carrying silver, lead and gold. The strike of the vein, which is a true fissure,

is north and south, and is considerably faulted, making it the more difficult to follow the ore. There is, however, some very high grade ore opened up, which is being shipped. The country rock is granite and gneiss and much decomposed. The equipment consists of an Ingersoll-Sargent air compressor of five drill capacity, and a forty-horse power boiler. The worked-out stoping ground is well filled with rock making the ground secure against caving. The property has a 100-ton concentrator that is only operated when there is second class ore on hand for a run. The mine is well timbered and ventilated.

THE RIPPLE MINE.

The Ripple mine is owned by the Ripple Mining company of which J. C. Barker is the superintendent and twelve men are being steadily employed. The property is located south of the Benton group. The main tunnel has reached a length of 550 feet of which 150 was driven during the present year, and a raise is in course of construction to connect with the upper workings for ventilation and exit to the surface. The formation is granite and porphyry and the width of the vein is from three to seven feet, the ore being high grade and carrying values of silver, lead and gold. The present output is from 200 to 300 tons per month. Considerable new development work is under way and the force of men will be largely increased.

Chouteau County

Chouteau county in all past years has been looked upon as an exclusively agricultural and stock section, though careless and intermittent prospecting done in the Little Rockies in the neighborhood of Landusky and on the eastern side of the range had demonstrated that the mountains contained some valuable mineral lodes. During the past couple of years the sections about Landusky and Zortman have been more systematically and extensively developed with the result that these districts have been quite fully demonstrated and several producing mines

established. Zortman is a new camp located on the east side of the range, and though but a couple of years old, now has a population of over 300 and is growing rapidly. The most largely developed properties in this vicinity are the Putnam, Alabama, and the Independent groups. Zortman is prettily located in a little basin surrounded by mountains, and has the good fortune to have an abundance of water for both domestic and power purposes, furnished by mountain streams. The town is 55 miles south of Malta its nearest station on the main line of the Great Northern railway. The mineral zone appears to extend the whole length of the range on the west or Landusky side, and as prospecting is extended it gives evidence of doing the same on the east or Zortman side, and the mineral zone can be traced from the Kendall to this district. The lodes in the Zortman district are very large and the character of the ore is free and cyaniding and development is not difficult.

The output of metals for 1904 was united with that of Cascade county. For 1905 the metals output was as follows:

Gold, fine ounces, 8,640.167—\$178,608.10.

Silver, fine ounces, 6,680.51—\$8,637.43.

The gold production of Chouteau county for 1904 was united with that of Cascade county.

THE ALDER GULCH MINES.

The Alder Gulch Mining company is the owner of the Putnam group, consisting of three claims. Mr. E. W. King is general manager of the company, Mr. O. P. Zortman is the superintendent and Mr. W. T. Kellman is the foreman. Sixty men are regularly employed. The property is being worked through a series of tunnels. The upper tunnel is driven in 500 feet, and is connected by an ore chute from above, where ore is being quarried from an open cut, the product being sent down the chute, out the tunnel, down the mountain by a gravity tram, and then teamed to the mill. A tunnel 900 feet long has been driven that intersects the vein at much greater depth and this has been connected with the upper workings so that in the future all the ore extracted from any

part of the workings will come out through this tunnel and will avoid the necessity of the tram. The ores lie in large chambers in a faulted lime and porphyry formation and are a silicious lime that yields the most readily to cyanide treatment. The strike of the ore body is east and west. At present the cost of mining and hauling is less than 75 cents per ton and the ore values run from \$12 to \$45. The development of the property is kept well ahead of the extraction so that there are always large reserves of ore blocked out. The mine is in good condition and has good ventilation. The ground is soft and requires close timbering.

THE RUBY GULCH MINING COMPANY.

The Ruby Gulch Mining company owns and operates the Independent group, the property being located one and a half miles west of Zortman. Mr. Charles Whitcomb is the general manager of the company and Mr. George Powers is the foreman. Eighty men are given steady employment on the property. The mine is operated through tunnels, the longest of which is 500 feet and which was constructed during the present season. This tunnel cuts the vein at 100 feet vertical depth and is connected with the surface where ore is being extracted from an open cut and sent down a chute to the lowest tunnel level, and thence to a horse tram that conveys the ore to mill. The values are gold and are carried in an iron sulphide, the ores being treated with the usual cyanide process. Until recently the mill has been treating 200 tons per day, but the mine being placed in condition to increase its output one-third, the mill capacity was also increased so that they are now handling 300 tons every 24 hours. The country rock is porphyry, lime and quartzite and the ore lies in large chambers in porphyry. The general strike of the vein is east and west and dips southwest at about 55 degrees. The development of the mine is kept well ahead of the stoping. A large vein has been discovered on the north end of the property, carrying high surface values and will be extracted first from this by open-cut. The district in this vicinity is highly mineralized, but is still comparatively little developed.

THE ALABAMA GROUP.

This property is situated on the summit of the Little Rockies and is owned by the Alder Gulch Mining company. A tunnel 1,100 feet long is being driven 500 feet of which was driven during 1905 and some 400 feet during the present year. The tunnel has penetrated some large bodies of cyaniding ore, which is being extracted and treated at the mills of the company, located about one mile from the mines. The strike of this vein is east and west and the country formation is porphyry and lime. An aerial tram for the conveyance of ore is to be constructed from the mine to the mill.

THE RAWHIDE MINE.

This property is located one and a half miles south of Zortman and adjoins the Alder Gulch property to the east. A tunnel has been driven on the vein 300 feet and is showing well in the face, some of the ore being high grade and has been shipped. So far, however, the principal work done on the property has been in the development of the ore bodies, and the ore produced by the development is largely on the dumps. The treatment best suited to the ores of this property is yet to be determined.

Deer Lodge County

Mining in Deer Lodge county has received considerable impetus during the present year and some very promising ore bodies have been opened up in the Cable, Georgetown and Moose Lake districts, the development giving evidence of some very extensive mineral lodes. The districts, however, are little prospected and except for the instances mentioned, not at all developed. The county seat of Deer Lodge—Anaconda—is noted as the site of the great Washoe and Anaconda smelters, whose output of copper is familiar to the entire world.

The following is the production of metals for 1904:

Gold, fine ounces, 9,947.483—\$205,362.73.

Silver, fine ounces, 9,180.30—\$11,869.48.

The following is the production of metals for 1905:

Gold, fine ounces, 9,258.177—\$191,383.51.

Silver, fine ounces, 6,333.28—\$8,188.48.

THE SOUTHERN CROSS MINE.

This property is located on what is locally known as the Georgetown flats, and three miles southwest of Silver Lake, and is owned by the Southern Cross Gold Mining company, Mr. Lucien Eaves being the general manager and Mr. George Krier the foreman. The property has been quite extensively developed during the past year, the incline shaft now being down 350 feet, and is equipped with a skip and steam hoist of the Kendall make. Altogether some 2,000 feet of development has been accomplished and sixty men are given steady employment. The property has a 60-ton mill and cyanide plant where the output of the mine, except the higher grades which are shipped direct to the smelters, is treated. The ore is an iron oxide and occurs in large elipses.

There are some very promising properties being opened in the immediate vicinity, and which are making shipments to the smelters at Anaconda.

THE GOLD COIN MINES.

The Gold Coin properties are located near Silver Lake, eighteen miles from Anaconda, and are owned by W. J. White. D. F. Ireland is the superintendent, and employs thirty men. There is a two-compartment shaft timbered with 10x10 timbers, but this is only used for air and exit, the property being worked by tunnels, the main tunnel being a crosscut that cuts the vein at a distance in of 800 feet, and drifting has been done on the vein from the point of intersection, for a distance of about 800 feet, and ore has been stoped at various points along the drift. An upraise has also been made to the upper workings. The property is equipped with a 6-drill Rand compressor and a 30-stamp mill, which is located about 200 yards below the lower tunnel portal. The mill has a capacity of 200 tons per day. The ore is a high grade and carries principally gold values, and the ore bodies occur in large chambers or deposits. The strike of the vein is east and west and the dip is slightly south. There are

nine patented claims in this group, and the surface showing on them is good. There are a number of promising claims in this vicinity that are being worked by prospectors.

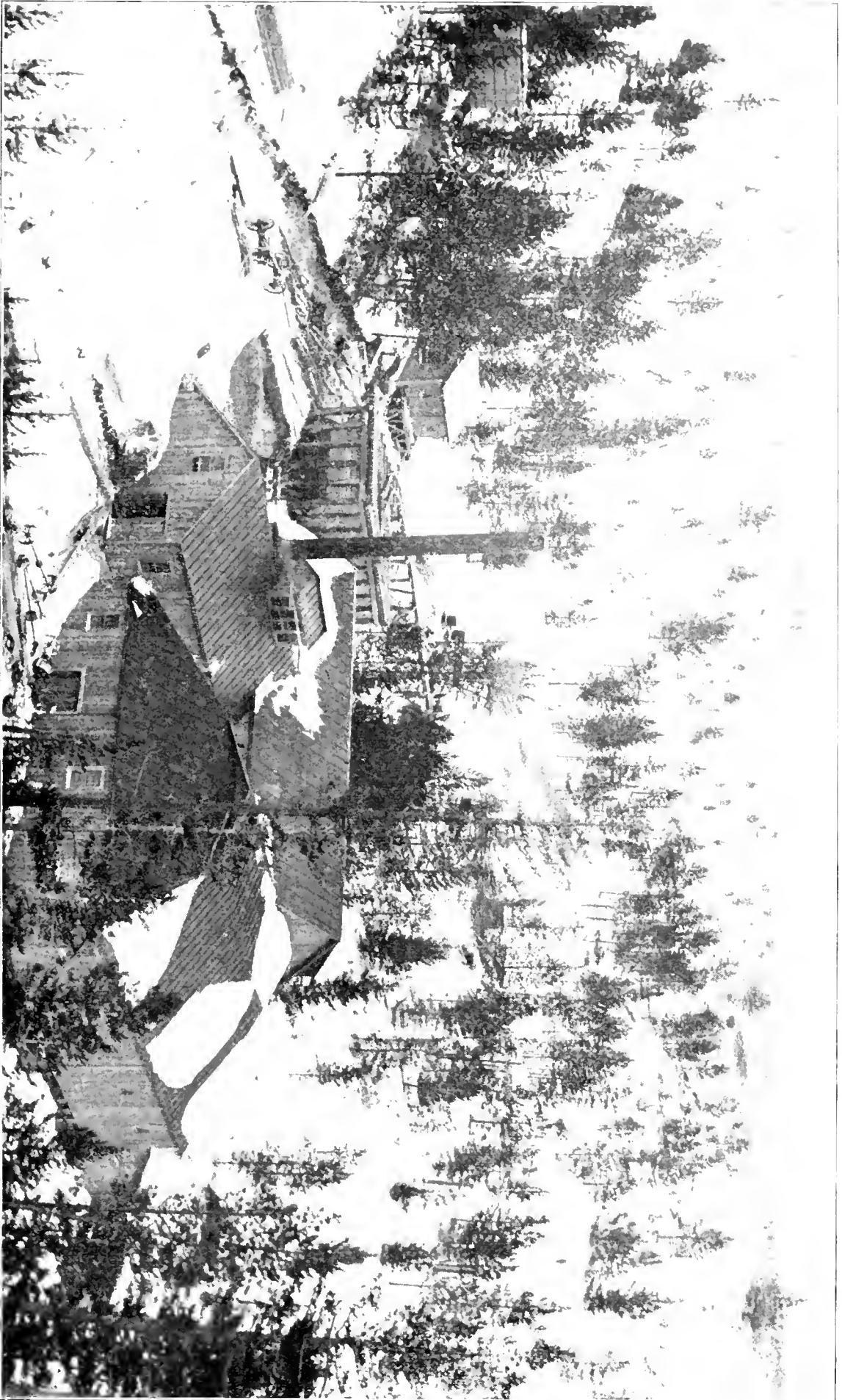
THE MONTANA MINE.

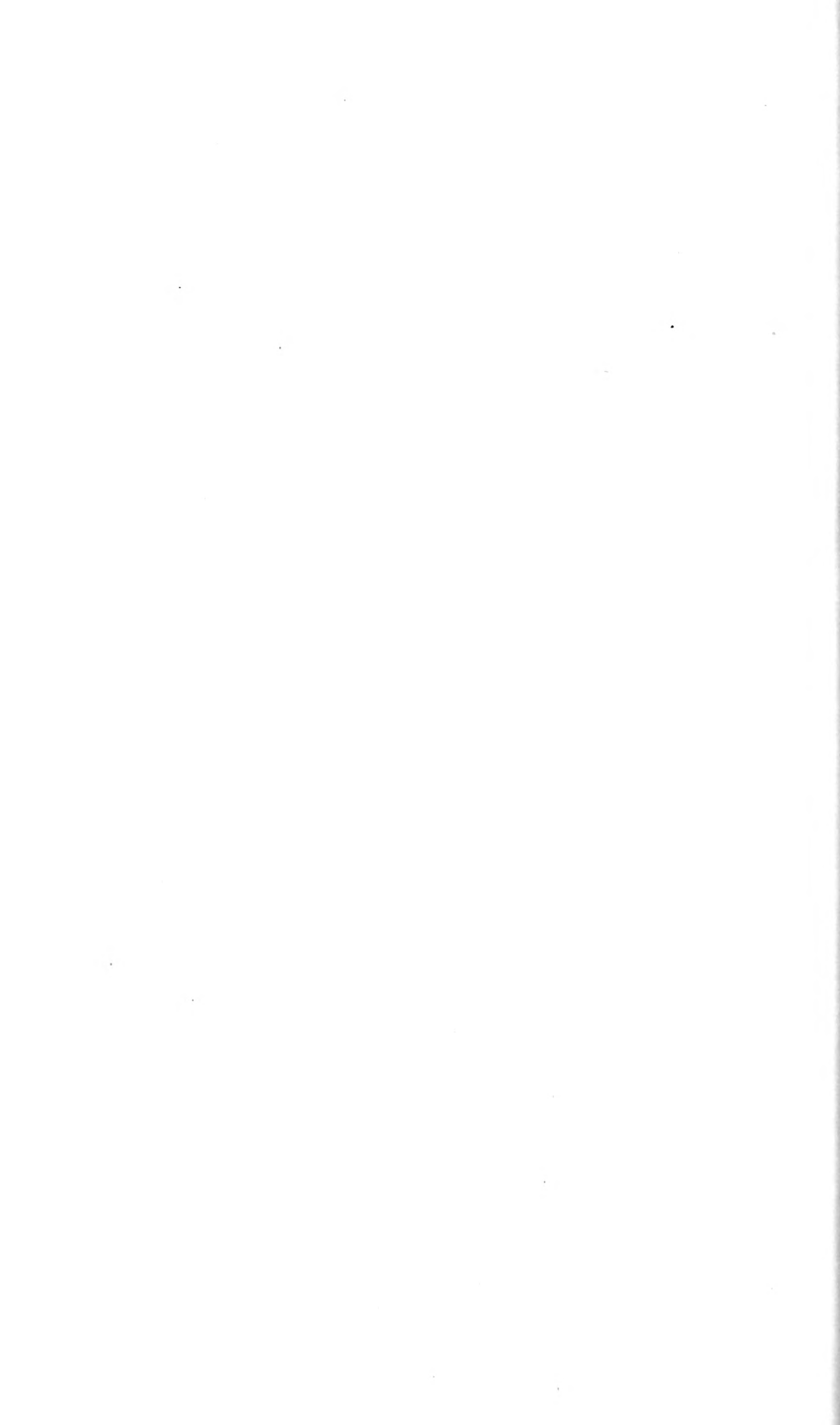
This property is situated in the Georgetown mining district, and is owned by Mr. Matt. Gaffeny and John Ducie of Anaconda. A shaft has been put down 110 feet and the vein has been explored from that level a distance of 125 feet east showing a well-defined lead and an ore body running from 20 to 40 feet in width, a heavy iron oxide carrying gold values up to \$12.00 per ton. The shaft is equipped with a horse whim. The indications are that when this property has been developed to proper depth that it will become a great producer, and will undoubtedly add copper to the ore values, as it is demonstrated that in Montana, iron ores bring in copper with depth.

THE CABLE MINES.

The Cable mines are located 16 miles west of Anaconda and on what is known as Cable mountain, and are operated by the Cable Consolidated Mining company, of which Mr. H. C. Bacon is superintendent and Mr. P. J. Whitty is the foreman. Forty-four men are given steady employment. The property is operated through a tunnel and shaft workings, a shaft having been put down 200 feet from the tunnel level, 100 feet of which was sunk this year. The shaft is equipped with an 8x10 Ledgerwood steam hoist, a $5\frac{1}{8}$ round steel cable, an Ingersoll air compressor, and two diamond drills for prospecting work. The main tunnel is 2,500 feet in length and taps the vein at a depth of 400 feet. In the aggregate there has been over 3,000 feet of development work accomplished, of which about 300 feet has been done this year. The tunnel work is timbered with sets, and the stoping with stulls and break and fill. The country formation is lime and granite. The high grade ores lie in chambers of varying sizes, some of which are very large. The character of the ore revealed with the depth attained is wholly free milling. It is the intention of the management to sink to much lower levels in

WHISKY GULCH MILL, JUDITH MOUNTAINS, FERGUS COUNTY





KING-JARNE'S MILL, NORTH MOCCASIN MOUNTAINS, FERGUS COUNTY



the near future. The output of the mine supplies a 30-stamp mill that has a capacity of 250 tons per day and is in constant operation. The mill is complete and modern in every particular. Part of the mineral area of the company's holdings is placer ground, and the management is making preparations to establish a hydraulic plant to handle this ground. The quartz lode now being worked was first discovered in the cleaning of the placer bedrock.

THE McAULIFF MINE.

This property is being worked under lease by Messrs. Burns & Deno and is located on the west end of the Southern Cross property. The ore body has been found to lie under an iron capping, which has been penetrated by a shaft. Shipments of ore are being sent to the Washoe smelters at Anaconda. The property looks promising.

Flathead County

The mineral area of Flathead county is very extensive and in several districts affords the most attractive quartz and placer mining opportunities, though it may be said that none of these districts have attracted the capital or the attention they warrant. There is no portion of the state or of any other state that affords mineral area that give better prospects for successful development, and for large returns upon capital invested. The showing of gold, silver and lead in the Cabinet range, is not excelled anywhere and the lodes that have been developed to any extent have proven to be strong and persistent fissures. Promising copper bearing lodes have been discovered on the North Fork of the Flathead river, in the northern part of the county. At present there is a good deal of prospecting going on and there are a large number of men developing their own claims. The Fisher property has been closed down for some time, though it is considered a good property, and the Kootenai Mining company property in the Cabinet range has been closed part of the summer on account of a disagreement among the stockholders. The property, however, is rated as a good one, and is said to

have been on a paying basis when closed down. There is every indication that mining in the districts mentioned will, in the very near future, become much more active.

The following is the production of metals for 1904:

Lead, fine pounds, 747,869. The other production was united with Granite.

The following is the production of metals for 1905:

Gold, fine ounces, 1,101.050—\$22,760.72.

Silver, fine ounces, 29,905.12—\$38,665.11.

Lead, fine pounds, 1,415,691.

THE RUSTLER MINES.

The Rustler Mining company's property consists of a group of claims known locally as the Snowshoe group, and is situated at the head of Snowshoe gulch, 20 miles south of Libby, a town located on the Great Northern railway. The mine was in constant operation during 905 and part of this year, but was forced to stop the operation of the mill during the greater part of the summer on account of a shortage of water necessary for concentrating the ores. Development has been carried on steadily and large ore reserves have been blocked out. A 550-foot shaft has been sunk from the level of the lowest tunnel, securing a total depth of workings of 1,800 feet below the apex of the lead. There are five tunnels varying in length from 400 to 1,700 feet. Eight hundred feet of development was accomplished during the present year. The ore is a sulphide carrying gold silver and lead and the vein is a true fissure striking east and west and is almost vertical. The walls of the vein are well defined. The formation is lime and slate, with some quartzite in the vein filling. The equipment consists of an Ottumwa steam hoist, an 8-drill Ingersoll compressor, a set of single deck cages and a 225-ton concentrating plant located near the mine workings. The timbering is square sets and stulls. There are numerous connections throughout the workings affording ample means of escape and good ventilation. When the mill is in operation ninety men are given regular employment. Mr. W. D. Wrighter is the superintendent, and Mr. Wm. Browning is the foreman.

THE BIG EIGHT MINE.

The Silver Torrent Mining company own and operate the three claims comprising the Big Eight mining group, situated six miles south of Troy. The mining operations are carried on through tunnels, the lowest of which is driven from the creek bed and taps the vein at a depth of 600 feet, and an intersecting tunnel has been driven through the ridge and this affords an exit and ventilation. The vein is well defined and the ore body has been opened for a distance of a little less than 300 feet. The ore is a high grade silver-lead-zinc combination, and four car loads have been shipped monthly, going to Seattle and thence to Germany for treatment. In the line of development accomplished during the year, a crosscut tunnel has been run 450 feet and 350 feet of drifting has been done from its intersection with the lead, a 75-foot winze has been sunk and some drifting east has been done along the vein from the level attained. The formation is a hard, black slate and the vein is a true fissure. The property is operated under the supervision of Mr. Frank Earnest.

THE MOLLIE GIBSON MINE.

The property consists of two claims that are located in the Snowshoe district. The vein has been discovered for a distance of 1,800 feet and the work that has been done has been in the line of development and to ascertain the continuity of the ore body revealed by the workings, which comprises some 600 feet of tunneling. The vein is a fissure and the ore carries its values in lead and silver.

THE JULY MINE.

The July mine is located on Grouse mountain and is owned by Messrs. Moore & Sweeney, who have put a shaft down 100 feet and have done some drifting from the lower level secured. The owners are negotiating a sale, and it is anticipated that after the transfer extensive development will be pushed with vigor.

THE DIAMOND HILL MINES.

These mines are located on the south side of Grouse mountain and are opened by a crosscut tunnel that encountered the vein 300 feet in and at a vertical depth of 500 feet, and at the time of inspection drifting east and west was being done and regular shipments of ore being made. The country formation is slate and schist with intrusions of lime. The property is owned by Martin Grace & Co.

THE MONTEZUMA MINE.

The property is located in the Big Eight district, south of Tory, on Grouse mountain, and is owned by Downey Bros. Operations up to the present time have not been extensive, and the development work accomplished has been done with a view to ascertaining the extent of the vein and the probable ore values that might be secured by systematic and proper development, which will be prosecuted the coming year.

THE B. & B. MINE.

The B. & B. is located on the west side of Grouse mountain and is an extension of the Big Eight property. The mine is now operated through a series of tunnels run on the vein, that average in length from 50 to 500 feet, and these tunnels are connected by raises. The vein is well defined and shows bodies of ore that run high in gold and silver values. The formation is slate and schist.

THE SILVER CABLE MINE.

Considerable development has been accomplished on this property during the year, revealing sulphide ore bodies carrying good gold values. The owners of the property have been sufficiently satisfied with the results of development to erect a 50 ton concentrating plant, which, however, is not yet in readiness for operation.

THE LIBBY MINING CO.

The company owns a very promising property upon which it has done a small amount of development and have erected a two-stamp testing plant for the purpose of determining the best process for saving the ore values.

Fergus County

Fergus county is one of the largest counties in this state of large counties being 125 miles long by 110 miles wide, and nature has endowed it with a multiplicity of resources, that, as they are developed, must make it an empire as great in its output of wealth as is its area. While the county has great stretches of bench and prairie, it also has four distinct and separate ranges of mountains, and the North and South Moccasin and the Belt ranges extend into it. The topography of the county is as varied as its resources. Its plains support great herds of cattle and flocks of sheep; its benches and valleys cannot be surpassed in agricultural productiveness; underlying the plain and bench are great coal measures and beds of red hematite; in the mountain ranges great lodes and zones of rich mineral—so it is, as the inhabitants boast: "We have an empire and the riches to support it."

For the past twenty-five years the county has produced the precious minerals to some extent, the principal mines being the McGinniss and the Spotted Horse, both located near Maiden, and these have a record of producing three million dollars in gold bullion and are still producing; and in some of the gulches there have been productive placers and several of these are being worked now. It has only been in recent years, however, that the cowpuncher has been compelled to divide honors with the miner in this dominion of natural resources and universal prosperity; but the development of mine and farm has taken away his monopoly.

The Judith mountains present peculiarly favorable conditions for the study of the relation of ore deposits to geological structure. The problem is a complete one, as the geographic isolation of the mountain group corresponds with the geologic isolation, the region presenting none occurrence of ore deposits with lac-

colittic and other intrusions which have disturbed previously horizontal rocks. Profound dynamic movements which have occurred in the main range of the Rocky mountains, have not taken place in this range. The mine workings are as yet not extensive or deep enough to reveal complete knowledge of these interesting ore deposits.

The following is the production of metals for 1904:

Gold, fine ounces, 56,737.624—\$1,172,870.78.

Silver, fine ounces, 2,058.66—\$2,661.70.

The following is the production of metals for 1905:

Gold, fine ounces, 60,869.267—\$1,258,279.42.

Silver, fine ounces, 2,850.70—\$3,335.98.

THE BARNES-KING MINES.

This company's holdings comprise twenty-two patented claims, in the immediate vicinity of Kendall, in the North Moccasin mountains. Five of the claims are under process of operation and exploration, through central workings. There is a 280-foot shaft on the vein and another has been sunk to the east to a depth of 235 feet, going down on a 40 degree incline in the ore body. This incline is used for the hoisting of the ores from this point from the north end of the property, some 4,500 feet distant from the central workings. The equipment consists of a 60 horsepower Anaconda engine and Atlas boiler, for hoisting; a 40 horsepower generator supplies the power for drills and belt conveyors that are used in the mill and cyanide plant, in the latter of which there are ten leaching tanks that have an aggregate capacity of eight to nine thousand tons per month. Development is carried on extensively, keeping far ahead of the extraction of ore, and a diamond drill operated by electric power is used in exploring the country. The ore is a silicious lime and lies between sand and limestone walls that are very hard, the cyanide process saving 90 percent of the ore values. After the extraction of ore the stopes are filled with waste. The mine is well ventilated and has all necessary escapes to the surface. Mr. E. W. King is the general manager of the company, Mr. H. J. Shaw is the superintendent, and Mr. John McGee is foreman.

THE KENDALL GROUP.

This group of mines, owned and operated by the Kendall Gold Mine company, are situated one mile from the town of Kendall, in the North Moccasin mountains. The mine has been operated through a 45 degree incline shaft that connects with some 7,000 feet of workings. The management is now sinking a 600-foot vertical working shaft, and when this is completed and connected with the lower workings, taking of ore through the incline will be abandoned. The perpendicular shaft will later be sunk to a total depth of 1,000 feet. The mine is equipped with all necessary machinery, which, for the most part, is operated with electric power. The hoist, which is operated with electricity, is 150 horsepower, of the double drum pattern that is manufactured by the Denver Engine Works. A 75 horsepower motor drives the 8-drill Ingersoll compressor. The hanging wall of the lode is sandstone and the foot wall is lime. In the upper workings the ore body is 35 feet in width and this widens to 50 feet in the lower levels, and is a silicious lime and altered sandstone. The ore is transported from the mine to the mill, where it is treated with the cyanide process, by horse tram, the plant having a capacity of 8,000 tons per month. The ore reserves are kept constantly ahead of the extraction. The mode of timbering is square sets and stulls, and the mine is properly provided with means of egress and is well ventilated. Mr. H. H. Land is the superintendent and Mr. Charles McLean is the foreman. One hundred and fifty men are constantly employed.

THE GILT EDGE GROUP OF MINES.

The Gold Reef Mining company owns and operates the Gilt Edge group, consisting of fifteen patented claims. Mr. H. M. Rae is the manager, Mr. A. M. Blumb the superintendent, and Mr. R. F. Turnbull is foreman, ninety men being given employment on the property. The mine is operated through a series of tunnels, the main tunnel being 5,000 feet in length, 2,000 feet of which is extended along the vein and uncovering large bodies of ore, much of which is blocked out and held in reserve. The ore is an altered lime, entirely free from quartz and carrying gold values. The ore extracted from the upper workings is conveyed to

the main tunnel by chutes, and thence to the mill by horse tram. The ores are treated at a mill and cyanide plant that has a capacity of 350 tons per day, and to this a roasting plant has been added to treat the black unoxidized ore that has been encountered by sinking 200 feet below the lower tunnel level. A new drill compressor plant of the Rand make has been installed, and an additional water supply is being brought in from Whiskey gulch, a distance of three miles, through a wooden pipe. The country rock is lime and porphyry and stands well. The system of timbering is square sets and stulls. The mine when inspected was in fair condition, and the ventilation, with some slight improvements to be made, was good.

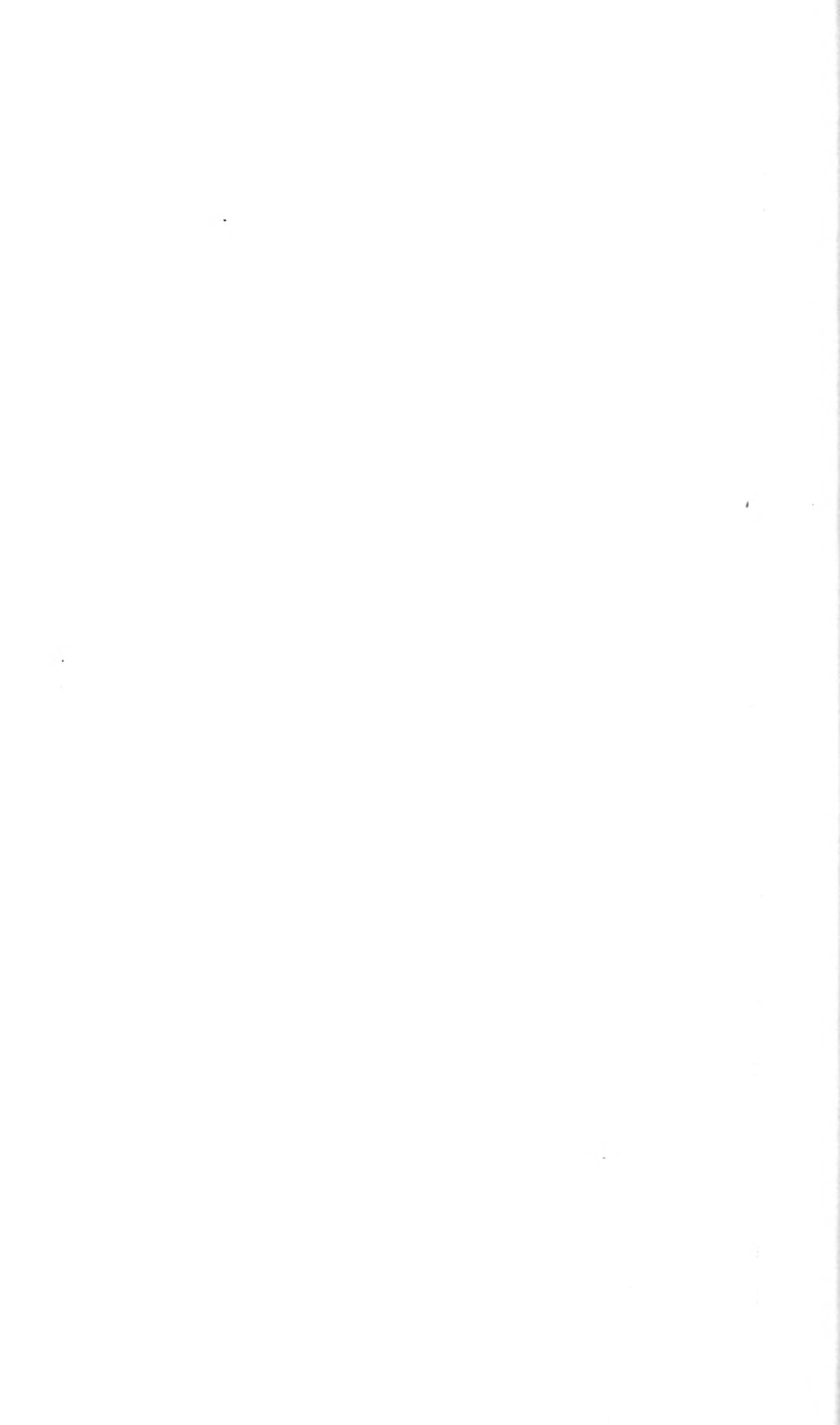
LAST CHANCE MINE.

This property is located one mile east of Maiden, is owned by Mr. J. B. McFatricks, and is operated by Mr. Joseph Bellis, who employs eight men on the property. A shaft is being put down 200 feet and from that level a crosscut will be run to intersect the vein, and when this is secured, machinery will be installed and development extensively and systematically carried on. The vein filling is a conglomerate carrying surface gold values up to \$3 per ton. On the east end of the claim the management has driven a tunnel 550 feet, to intersect the vein. A plant will be established on the property for the treatment of the mine product.

THE MCGINNIS MINE.

The McGinnis mine, in the Maiden district, is under lease and bond to the Globe-McGinnis Mining company, Mr. R. W. Doran being the general manager and superintendent. The mine is operated through tunnels, the longest of which is 1,350 feet. There has been about 8,000 feet of drifting done from time to time, and during 1905 and this year over 300 feet of drifting and 175 feet of upraising was accomplished, all this work being done in ore and to ascertain the values carried. An exploration shaft was also sunk 225 feet and considerable development done from that level. The ore from the upper workings is sent to the lower tunnel through chutes, and is taken to the mill by horse tram. The mill has a capacity of 125 tons per day, and from 75 tons to the maxi-

NATHAN CLARK IN GOLD EDGE MINES, ABOUT 12 ACRES, PEBBLE COUNTY



VIEW OF DR. BUSSELMAN'S MILL AT GARNER



imum capacity is treated daily. The ore bodies are usually secured on the contact between lime and porphyry and runs as high as \$500 per ton in gold. There are 40 men employed at present, and the company is making arrangements to greatly extend the workings and plant capacity. The mine is in fairly good condition and is well ventilated.

THE CUMBERLAND GOLD MINE.

This property is situated one mile east of Maiden and is operated by the Cumberland Gold Mine company, employing 20 men, Mr. Peter Rosso being the general manager and superintendent in charge. A perpendicular shaft 250 feet deep, of which 100 feet was constructed during this season was put down, and some development accomplished from that level, the workings being operated by a horse whim. The company is preparing to install machinery with a sinking capacity of 650 feet and will develop the property extensively. Regular shipments of ore have been made to the East Helena smelters. The country rock is porphyry and lime and the vein is a conglomerate, the strike being east and west. The company will erect a 20-stamp mill to treat the output of the mine. The district is well mineralized and development in the near future will fully demonstrate its value.

THE NORTH MOCCASIN GROUP.

This group, consisting of four claims, is operated by the North Moccasin Mining company. The mine is developed by a shaft 325 feet in depth, of which 130 feet has been accomplished during the present season. The equipment consists of an electric hoist and cage, with all safety appliances. Six men are employed in drifting and exploring, and when the continuity of the ore bodies is demonstrated, a mill and cyanide plant will be erected for the treatment of the ores. The mines are located in the Kendall district. Mr. H. M. Rae is the superintendent and Mr. Robert Scott is the foreman.

THE QUEEN GROUP.

The Queen Gold Mining company is operating this group of claims which are situated one and a half miles north of Kendall, the group formerly being known as the Bullard property. Prospecting has been carried on extensively, mostly with diamond drills, and large bodies of ore, it is reported, have been revealed. The ore is a cyaniding character, carrying gold values.

THE WAR EAGLE MINE.

The War Eagle property is located two miles south of Maiden, and is owned and operated by Messrs. Burt & Stuart, Mr. John Right being the foreman. The property is opened by two tunnels drifted on the vein, and which are 75 and 300 feet respectively, in length. The vein is a fissure and the ore is an iron sulphide carrying values in gold and copper, some being of sufficiently high grade to warrant shipping. The mine is one of exceptionally good promise.

THE NEW SAPPHIRE MINE.

This property is located on York creek, 40 miles west of Moore, a town on the Montana railroad. The mine is operated by the London Sapphire company, Mr. Charles Gladsden being the general manager and superintendent, and Mr. W. A. Danforth the foreman. Forty men are employed on the property, which is operated through a 100-foot shaft, from the level of which some 2,000 feet of drifting has been done. The vein filling is a blue clay or porphyritic deposit carrying the imbedded gems. The vein matter is mined and hoisted to the surface, where it is exposed to the elements and soon disintegrates, the product then being washed through sluices, as in gold placering, and the precious stones are caught on the riffles. The mine is worked systematically, is well equipped, and has proper safety provisions.

THE AMERICAN SAPPHIRE MINE.

This property is situated on Yogo creek, and within three miles of the London company's property, and is owned and operated by the American Sapphire company, having acquired the property from Messrs. Burke and Sweeney, the original owners. The operation of the property has been very successful during the past season, and next year the product will be greatly increased. The mine is operated through tunnels, the longest of which is 1,300 feet, is drifted in the vein, and has secured a vertical depth of 300 feet. During this season over 400 feet of the development has been accomplished, and the company is now erecting a plant that will handle the output just as it comes from the mine, dispensing with the necessity for open-air decomposition and sluicing.

Granite County

The principal mines operating in Granite county during the year were the consolidated Granite-Bi-Metallic at Granite, the Hope at Philipsburg, the Sun Rise near Stone Station, the Mitchell & Mussigbrod group, Grant, Hartford, Nancy Hanks and the Shamrock, at Garnet. Since the inspection operations have ceased at the Granite-Bi-Metallic, which had been worked during the past couple of years by leasers, some 150 men finding steady employment. This property has been a great producer, and it is hoped that some day it may again be placed in that class. Like almost every other prospect, these claims passed through the usual vicissitudes, each, at one time, passing into other hands for a very small consideration. With each promotion effort, however, some additional development was accomplished, and in the '80's they were finally developed into mines that have since that time added \$31,000,000 to the wealth of the world and enriched their owners in the neighborhood of \$20,000,000. And it may be said that in this county there are a number of equally good prospects that are awaiting the investment only of enough money to accomplish their proper development to become great producers. The Garnet district embraces the mining camps of Garnet, Coloma and Top of Deep, the latter being the highest of an inter-mountain range trending easterly and westerly, be-

tween the main range of the Rockies to the east and the Bitter Root range to the west; to the south, the summit of this range, and known locally as Elk mountain, is the boundary between Granite and Powell counties, and has an altitude between 7,500 and 8,000 feet. The Nevada valley, through which the Big Blackfoot river, a tributary of the Missoula river, flows, lies to the north and east, and Hell Gate valley to the south, and Garnet, the center of this district, lies about 50 miles west of the continental divide. The camp has daily communication by stage with Bearmouth, a station on the main line of the Northern Pacific railway, ten miles distant. Coloma is three miles from Garnet, and Top of Deep is six miles.

The following is the production of metals for 1904:

Gold, fine ounces, 4,858.983—\$100,444.09.

Silver, fine ounces, 1,402,922.70—\$1,813,879.86.

The following is the production of metals for 1905:

Gold, fine ounces, 7,247.306—\$149,815.12.

Silver, fine ounces, 726,505.48—\$939,320.22.

Copper, fine pounds, 8,000.

Lead, fine pounds, 98,687.22.

THE FIRST CHANCE MINING COMPANY.

The properties of the First Chance Mining company consist of thirty-two patented claims, located at Garnet, and owned and operated by Mitchell & Mussigbrod. For convenience of description, the property may be divided into two groups, in the first of which there are two parallel fissure veins, trending in an easterly and westerly direction, dipping north at an angle of 30 degrees. On the Lead King and Crescent, 3,000 feet of drifting on the vein has been done, a shaft has been sunk 250 feet on the vein, in First Chance gulch, and three levels have been run into the Red Cloud vein. The veins are from two to five feet in width. At one point the vein is faulted 200 feet to the southwest, and this is opened by a crosscut from the Fourth of July workings, and considerable drifting was done, opening up an iron sulphite ore body running from two to four feet in width, carrying gold values. These veins apparently continue into Cave gulch, where they have been opened in the Cave Hill and Fairview claims, where the ore produced runs an average of from \$3.00 to \$7.00.

No. 2 vein runs parallel to No. 1 for about 1,000 feet. About 1,400 feet of work has been done on the Robert Emmet claim, consisting of a 200-foot shaft and three drifts on the vein showing an ore body from three to four feet wide, carrying gold values from \$7.00 to \$15.00 per ton. The company is doing a large amount of advance development work, blocking out extensive ore reserves, the only extraction being made by leasers from some of the smaller veins and from the surface ores, their product being from 250 to 300 tons per month, the ore being shipped to the Washoe smelters, at Anaconda, for treatment. Aside from the men employed in the leasings, the company is employing forty men in development work. The mines are in good condition, the workings being well connected and all desirable means of exit are provided, and the ventilation of the mine is excellent. The country formation of the district is very hard, but about the ore bodies, for the most part, is soft and requires timbering and to be filled after ore extraction, but the deeper development brought a change in the character of the ore, and it is intended to substitute the old plant with one of much greater capacity and a process that will make proper saving of the values.

THE NONPAREIL MINES.

The Nonpareil is situated seven miles east of Flint, a station on the Northern Pacific railway, and is owned by the Deer Lodge Mining & Reducing company, Mr. S. W. Dooney being the general manager. The company is now employing nine men, and these are engaged in the sinking of a shaft that at the time of inspection was down 110 feet, the hoisting being done with a horse whim. Additional to this work, the company has accomplished 500 feet of prospecting during the year, exploring the vein a distance of 150 feet east, opening up an extensive ore body that runs from 20 to 40 feet in width. The ore in the levels mentioned is an iron oxide that runs high in lead and silver. Shipments of from 100 to 200 tons are being made per month. The surface formation is a granite wash or glacial flow, and the lime filling carries good gold values and is not only valuable for its precious metal content, but is also desirable for fluxing. The workings are well ventilated.

THE HANNA GROUP.

This property is owned and operated by the Milwaukee Gold Extraction company, and is located in the Red Lion mining district, nine miles east of Philipsburg. Mr. George H. Savage is the general manager. Thirty men are employed. A crosscut tunnel 300 feet in length was run to tap the vein at a depth of 200 feet, and ore is being extracted from this level. Timbering is done with square sets, the mine is well ventilated and every precaution has been taken to prevent accidents. The ore is an iron oxide carrying gold values. The country formation is altered lime and granite, strike of the vein is north and south and dips west. An aerial tram of the Bletcher make has been erected to convey the ore output to the 150-ton mill and cyanide plant which has been erected a mile distant from the mine. The district is well mineralized, and as development secures depth the values increase.

THE HOPE MINING COMPANY.

The Hope is a mine that has been in almost constant operation for more than thirty years, is located one mile north of Philipsburg. Mr. J. R. Lucas is the superintendent and Mr. George Weaver is the foreman. The property is worked through a two-compartment shaft that is now down 550 feet, and is equipped with a steam hoist and cages that have all modern protection appliances. There is 2,600 feet of tunneling and 1,800 feet of other development on the vein, 750 feet of which has been done during the present year. Work is now confined almost wholly to the extraction of ore, the shipments being about 800 tons per month. The shipping product is a high grade gold ore. The ore occurs in large chambers, lying in lime, and the formation is hard and does not require close timbering. What support is necessary is secured with pillars, cribs and stu'ls, and as the ores are extracted the stopes are filled with waste. It is claimed that there has not been a fatal accident in this property during all its long and continuous period of activity. The workings are well ventilated. Attached to the property is an old-fashioned 10-stamp wet process mill, and this has continued to save the values so satisfactorily that it has not seemed desirable to make any change.

The property has paid \$5,000,000 in dividends. Thirty men are employed.

THE GRANT AND HARTFORD MINE.

This property consists of one patented claim that adjoins the property of Mitchell & Mussigbrod to the north, and is operated by the Garnet Gold Mining company, with Mr. T. C. Thomas, foreman. The mine is equipped with a 40 horsepower locomotive boiler, and an Ottawa 8x10 double action hoist and a Knowles pump. Exploration of the mine has been carried on chiefly through tunnels and a 200-foot incline winze that has been sunk from the lowest tunnel level. At the 150-foot winze level a drift has been run east on the vein 110 feet, and the same distance to the west, and a large amount of ore has been extracted between these levels. The west drift on the lowest level has a fine ore showing in the face. The total development accomplished during the year aggregated over 300 feet, 100 feet of which was added to the depth of the winze. The vein is a fissure with an east and west strike and is from three to four feet in width. The country rock is granite. The ore is an iron pyrites carrying gold values that range from \$25 to \$200 per ton, concentrating 6-into-1. Ore shipments amounting to 406 tons have been made and these netted \$16,728. The property is now under bond to a company of Butte men, of which Charles Greiner is the president and F. D. Melcher is superintendent. The mine is well timbered, and, with a few changes that were ordered made, is safe for the seven men employed in the workings.

THE NANCY HANKS MINE.

This mine is owned by Samuel J. Richie and is located at Garnet. A portion of the claim is at present under lease to Messrs. A. D. Dowery and W. Dowery. An incline shaft has been sunk on the lead 325 feet, 175 feet of which was put down during this year. There are several working levels run from the shaft. The equipment consists of a steam hoist and a three-fourths inch steel cable. The ore is an iron oxide carrying high gold values. The vein is well defined, lying rather flat, and in hard lime, the

ore occurring in large chambers. Three car loads of ore are being shipped per month. The owner is sinking a shaft on the north end of the claim to determine the extent of the ore bodies revealed by the workings, and a tunnel is being run in on the endline of the claim that, when completed, will intersect the vein at a depth of 200 feet. Drifts will then be run on the vein and the ore extracted through this tunnel and conveyed to the mill, which is less than 2,000 feet distant. There are ten men now employed on the property.

THE SHAMROCK MINE.

The Shamrock is located at Garnet and is owned and operated by Messrs. P. S. McDermott and C. Lannon, the former being the superintendent. There are nine men given steady employment in the mine. The mine is operated through an incline shaft, at an angle of 38 degrees, that is now down on the vein 350 feet, and levels have been run both ways. The workings are equipped with machinery that has a sinking capacity of 1,000 feet. The property has been idle for a considerable period, but is now being unwatered to the lowest levels and development from that point will be carried on extensively, while ore extraction will be carried on from the upper levels, and shipments will be regularly made. The ore values run in gold up to \$200 per ton. The vein is a contact between granite and lime, showing garnets. In the metamorphosed granite wall there are two veins striking at angles to the developed vein. The property cannot be said to be in a developed condition. The ventilation of the workings is good.

THE HOBO MINE.

The property with this suggestive and euphonious name is situated one mile east of Philipsburg and is operated by Mr. George Ternie. A crosscut tunnel has been driven into the mountain a distance of 2,800 feet, encountering several veins, but no ore has been extracted from these, as the low price of silver that has prevailed, and the high charges, have prohibited working them at a profit. There are several prospects being operated under lease in this vicinity, the aggregate tonnage shipped being from 100 to 200 tons per month.

THE MORNING MINE.

The Morning mine is situated two miles east of Philipsburg, and is owned by Dr. Merrill of Oakland, California, and being operated by Mr. Alex. Redmond, who employs fourteen men in the workings. The vein is a true fissure and is opened by several short tunnels, the longest of which intersects the vein at 200 feet and from this point a drift is run 360 feet along the vein and securing some very high grade silver ore. The formation is granite. Regular ore shipments are made to the smelters at East Helena.

THE GOLD REEF MINES.

The property of the Gold Reef Mining company is located eight miles up Flint creek. Mr. L. N. Lomas is the general manager and Mr. J. H. Price is the foreman. Fourteen men are employed. The property is operated through two tunnels, respectively 700 and 500 feet in length, and these being connected with upraises provide the workings with ample ventilation and with escapes. The formation is slate and quartzite and the vein is from three to four feet in width, and has an east and west strike. The ore is an iron oxide. A 50-ton mill and cyanide plant has been installed to treat the ores, which carry gold values. The ore is transported from the mine to the mill with a gravity tram.

THE ANDERSON MINE.

The Anderson mine is located in the Garnet district and is owned and operated by Mr. John Pearson and Mr. Nolan. The property has been opened with a tunnel 550 feet in length, and which has penetrated large bodies of good ore for a distance of some 300 feet. The vein is well defined, and the ore shows assay values, in the better grades, running from \$75 to \$100.

THE LITTLE DANDY MINE.

The Little Dandy mine is located five miles southeast of Garnet and is owned by Mr. Edward Spencely. The mine is developed

by a tunnel and a 4-foot vein has been cut that is producing ore of very high value. The district has been but little prospected and not at all developed, and the strike is considered an important one, and has stimulated both prospecting and development, with the result that there are now several very promising prospects in the immediate vicinity. The district has well defined and persistent fissure veins.

THE CRESCENT MINES.

The Crescent Mining company is at present confining itself to the systematic and extensive development of its property, which is located on Rock creek. The company is having a tunnel driven 1,700 feet to crosscut several known veins, the work being done with power drills. Six men are employed.

Jefferson County

During the past year there has been a noticeable revival of interest in mining throughout the county and several important ventures have been inaugurated, are being pushed with vigor and promise the most profitable results before the close of another year. Jefferson county comprises one of the best mineral districts of the state, and the backwardness of its mine development can only be accounted for by the fact that some of its best mineral areas are still remote from railway facilities. This deficiency, however, is likely to be overcome in the near future by the construction of lines that are promised. There are a number of prospects under development in the Cataract and Corbin districts, that for the work done on them, are showing up finely.

The following is the production of metals for 1904:

Gold, fine ounces, 8,113.305—\$167,716.90.

Silver, fine ounces, 166,635.03—\$215,447.32.

Copper, fine pounds, 161,100.

Lead, fine pounds, 727,200.

The following is the production of metals for 1905:

Gold, fine ounces, 8,911.840—\$184,224.08.

Silver, fine ounces, 462,785.52—\$598,348.95.

Copper, fine pounds, 168,000.

Lead, fine pounds, 823,800.

THE CATARACT GROUP.

The Cataract Mining company owns a group of eleven mining claims that are situated at the head of Basin creek, 12 miles north of Basin. Of the group, the Bullion and the Crystal claims have been principally developed. On the latter claim there has been a 450-foot crosscut tunnel run and the vein explored east and west from the point of intersection, for a distance of 1,000 feet, ventilation being secured with several upraises to the surface. The main tunnel on the Bullion has been run on the vein a distance of 3,700 feet, and is timbered with tunnel sets. Tunnel No. 2 is in on the vein 1,400 feet. Several hundred feet of development has been accomplished during the present year, and large bodies of ore have been exposed. Extensive development is still in progress, and a winze is being sunk from the lowest tunnel to determine the continued values of the ore, and from the level so secured exploration drifts will be run. Twenty men are employed in the mine. The company has constructed a concentrator and smelting plant with a daily capacity of 200 tons per day, to handle the product of the mine.

THE SUN LIGHT MINE.

This property is situated four miles east of Whitehall and is owned by McKay & Co., of that place but is now under bond to the Holdman Filter & Tank company of Salt Lake City, which is operating the property. Mr. H. P. Taylor is the superintendent in charge, and he is employing ten men and confining his operations for the present to development. The group consists of seventeen claims, and these are developed, and have been worked through a series of tunnels. A cyanide plant of 40 tons capacity has been erected on the property for the testing of the second-class ores, a large quantity of which are on the dumps, and if the process proves successful a 100-ton plant will be installed, to be used in connection with the concentration plant of that capacity that is now on the property. The indications are that the property will soon become a large and steady producer.

THE ADA MINES.

This property is owned and operated by the Ada Mining company. The group of claims is located in the Cataract district, ten miles north of Basin, at the head of Rocker creek. The first development of the property was the construction of a crosscut tunnel 270 feet in length, encountering the vein, and a drift west along the vein a distance of 150 feet. A 62-degree incline shaft has also been sunk in the vein, 200 feet of the work being done during the present year. This secured a depth of 200 feet below the tunnel, and exploration work is in progress from that level. The formation of the country is granite and the vein filling is porphyry. The vein is a true and persistent fissure and the values carried by the ore are copper and silver. The strike of the vein is east and west. The workings are equipped with a steam hoist. There are twenty men employed, Mr. James B. White being the superintendent. The group consists of seventeen claims.

THE MONTANA LAND AND DEVELOPMENT CO.

The company is developing and operating a group of claims that are located seven miles north of Basin, a town on the Montana Central railway, about 40 miles northeast of Butte. The claims that are regarded as lending special value to the group are the Eva May and the Red Bird, and these are developed by a shaft located on the former that has now secured a depth of 1,200 feet, and is timbered with 10x10 timbers. Four hundred feet of this shaft was constructed during this year. The shaft is equipped with a 14x16 Vulcan hoisting engine, single-deck cages, etc. The vein has been extensively explored from the various levels of this shaft. A two-compartment shaft has been sunk 100 feet during this season on the Red Bird, and considerable drifting done on the vein from the attained level. In all there has been over 600 feet of exploration work done during the year. In addition to this, a diamond drill has been used for prospecting, and this has located some bodies of very high grade ore. The country rock is granite, and the development has disclosed a vein or mineral zone of from 75 to 100 feet in width, and which has faulted in several places. The ore is a sulphide carrying gold, silver and copper. The company has constructed a 100-ton con-

centrator to handle the product of the mines. The property is protected with Babcock fire extinguishers. Mr. James Humes is the superintendent, employing thirty men.

THE BERTHA MINE.

The Bertha group is located one mile north of Corbin, a station on the Montana Central railway. The property is operated by Messrs. Bartlett & Chapin, the latter acting as foreman of the workings, regular employment being given to eight men. The property is developed and worked through an incline shaft 150 feet deep and is equipped with a gasoline hoist. The shaft is secured with 10x10 timbering and is double-compartment. Considerable development has been accomplished during the past summer, and a regular ore output of about 75 tons per month has been shipped to Butte for treatment. An 860-foot tunnel is now being driven and will intersect the vein at a much greater depth than the present workings, and when drifts are run at this level and connections are made with the upper workings, the output of ore will be greatly increased. The system of timbering used is sets and stulls. The developed vein is a true fissure cutting a country formation of granite and porphyry. The strike of the vein is east and west, and the width, as shown by the development, from five to seven feet. The ore is a sulphide carrying copper as the principal value.

THE LIVERPOOL MINE.

The Liverpool mines are situated in Lump gulch, one and a half miles north of Clancey, and are operated by the Liverpool Mining company. Mr. John Hamilton is the general manager, and Mr. E. A. Ely is the superintendent, and they employ thirty men. There is a main two-compartment shaft on the property 750 feet in depth, timbered with square 10x10 timbers, and over 1,000 feet of development has been accomplished from several levels, 300 feet of the work being done during the present year. The drifts are timbered and stulls are used in the stopes. The ore output has been about 180 tons per month. The workings are equipped with a Griffith and Wedge 10x12 geared steam hoist,

a one-inch steel cable, a 12-drill Rand compressor, and a No. 9 Knowles pump. The country formation is granite and porphyry, the strike of the vein is east and west, and the width from three to six feet, the lode being a true fissure. The ore is a sulphide that carries silver running as high as 500 ounces to the ton, some copper, and the ore runs high in zinc, the latter being sent to Denver for treatment. It has been the popular opinion that Lump gulch is not a deep mining locality, but the present development of this property, which has been idle for some years, is proving that the lower levels are going to produce both the richest and the most extensive ore bodies.

THE GOLDEN KERRY MINE.

This group is located on the right fork of Elkhorn creek, one mile east of Elkhorn, and is owned by Mr. John Rothfus. Mr. Alfred Morgan is the foreman, and employs thirty men. The property is developed and worked through a series of tunnels, the longest of which is 400 feet and taps the vein at a vertical depth of 300 feet, and some 300 feet of drifting has been done from the point of intersection, opening large bodies of ore and exposing the vein for a width of from twenty to sixty feet, this being one of the largest veins of the vicinity. The vein is a contact between granite as a foot wall and quartzite mixed with dolomite as a hanging wall. The ore is an iron sulphide carrying gold and copper, and shipments of 100 tons per day are being regularly made to the East Helena smelters. Mr. Rothfus is now constructing a 100-ton plant of the crusher and rolls type with cyanide vats, and when this is completed will treat all the lower grade ores on the ground with an easy saving of from 80 to 90 per cent. The plant will be a modern model of its kind. The mine is well timbered and the ventilation is good.

THE ELKHORN MINE.

The Elkhorn mine is located in the mining district of that name and is operated by the Elkhorn Silver Mining company, Mr. J. H. Longmaid being the general manager and Mr. J. Bosoden the foreman. The property has been idle since 1901, and

operations were only resumed in July of the present year, machinery being installed and the workings, which were down on a flat incline some 2,300 feet, were unwatered. A 12x14 Ledgerwood hoist has been installed and the mill will be equipped with the latest machinery for the reduction of the ores. Much of the machinery is now on the ground and it is expected the plant will be in full operation by the first of the year. Much of the machinery for the plant has been shipped from England, and among which are a couple of Truse vanors that it is thought will make a better saving than the Wilfley tables with which they will be run in competition. Sixty men are now being steadily employed on the property.

THE MINNESOTA MINE.

The Minnesota is one of the old properties of the Gregory district, being a claim 100 feet wide by 2,200 feet in length, patented some twenty years ago, and is now owned by the estate of Mr. Moses Manuel. The lead is about 100 feet in width, lying between trap rock and granite, the filling being a soft porphyry. Ore carrying gold, silver and lead has been mined from the grass roots, the ore zone starting at the hanging wall and straggling at a depth of 275 feet, over to the foot wall, the ore varying in width from one to five feet. The property was being developed to a greater depth by the sinking of a winze, when the owner, Mr. Manuel, met his death in the shaft by an explosion of accumulated gas from the gasoline engine that had been installed in a station near the collar of the winze. This shaft was put down some 130 feet, a level run on the ore a considerable distance and the ore stoped to the tunnel level. The property is not being worked at this time. The mine produced shipping ore from the grass roots to the 275-foot shaft and 250-foot tunnel levels.

THE CARBONATE CHIEF MINE.

The Carbonate Chief group is located at the head of Warm Springs gulch, seven miles south of Alhambra Springs, and is owned and operated by Mr. John Steinbrenner & Co., Mr. Philip Roth being the general manager and superintendent. Thirty-five men are constantly employed. The mine is worked through a

series of tunnels, the main one of which has been driven 1,600 feet and secures a vertical vein depth of 500 feet. During 1905-6 over 1,900 feet of development was accomplished and five air connections have been made with the upper levels. The mine is timbered with sets and stulls and the stopes are well filled as the extraction of the ores takes place. The ore is a sulphide carrying gold, silver and lead, and shipments of from 200 to 250 tons per month are being regularly made to the East Helena smelters. The country formation is porphyry and granite and the strike of the vein is east and west. There has been considerable faulting of the vein. The mine is well ventilated and, with some changes that were suggested, all precautions will have been taken to prevent accidents. The district is well mineralized and there are some very promising prospects in the vicinity.

THE KING SOLOMON MINE.

The King Solomon group is located three miles west of Clancey in Clancey gulch mining district, and is owned by Mr. J. S. Moreland, but negotiations are now pending for the transfer of the property to the King Solomon Mining company, of which Mr. Moreland is the general manager and superintendent. The property is developed by a 250-foot incline shaft, of which over 50 feet was sunk during the present year, and drifts from the several shaft levels. The workings are equipped with a boiler, Reverse Link Motion 30 horsepower hoisting engine, three-fourths inch cable bucket and skidway. Aside from the additional sinking of the shaft, there has been over 400 feet of drifting and a 150-foot upraise made to connect with an old shaft, during the present year. The country formation is granite, crossed by a great porphyry dike, faulting with the veins of the neighborhood to a considerable extent. The vein is a fissure, carrying galena with silver and gold values. The average output of the mine is 100 tons per month. With several changes made that were requested at the time of inspection, the property will be in good condition.

GREY EAGLE MINE, HIGH ORE GULCH, JEFFERSON COUNTY



THE HIAWATHA AND CUSTER GROUPS.

This property is located three miles northeast of Basin, on what is known as Cataract creek, and is owned by the White Pine Mining company, the stockholders being Michigan people. The mine is now under lease to Mr. Patrick Dowling and Mr. E. F. Smith, who were respectively superintendent and foreman when the company was developing the property. Fifteen men are now employed in the workings. The mine is operated through a two-compartment shaft that is located on the Hiawatha claim, timbered with 8x8 square timbers, and through a series of tunnels, No. 1 being in 800 feet and No. 2 850 feet. Considerable upraising and drifting has been done during the year, blocking out ore, and shipments are now being regularly made. The ventilation of the mine is good. The vein is a well defined fissure running from three to six feet in width.

THE COMET MINE.

The Comet mine is seven miles northeast of Basin in what is locally known as the Comet mining district. The mine was at one time a large producer, but has been lying idle for some years, and until a few months ago, except for such operations as have been conducted on the surface by leasers. This summer the property was acquired by the Cataract Copper Mining company, Mr. M. L. Hewitt, general manager, Mr. Andrew Boundy, foreman, and the principal work done has been the retimbering of the shaft and the installment of machinery preparatory to the unwatering and deeper development of the mine. Twenty men are now employed in the work. The company is also driving a 400-foot tunnel to intersect the lower workings, and, after some exploration is accomplished, contemplate putting down a three-compartment working shaft.

THE BLUE BIRD MINE.

The Blue Bird group is located six miles northwest of Wickes and is owned and operated by the Michigan Mining & Development company, Mr. John Faeredy being the superintendent. The main tunnel has been driven 1,500 feet on the vein, one-third of

this work being done during the present year. This tunnel is being extended and connected with the upper levels, and will be made the main working artery of the mine. Some large bodies of ore are blocked out and ready for extraction. The principal work now being done is that of exploration and the opening up of new ore bodies. The company intends the erection of a 100-ton plant on the property for the treatment of the mine output. The property consists of three claims. The strike of the veins is east and west through a formation of diorite, and the ore is a sulphide carrying gold, silver and copper. The mine is well timbered and ventilated, and fourteen men are given constant employment. This number will be greatly increased in the near future.

THE GRAY EAGLE MINE.

The Gray Eagle group has been in continuous operation during 1905-6, and has recently been acquired by the Cataract Copper company of Basin. The group is situated at the head of Bishop creek, and is developed by and worked through a series of tunnels, the longest of which is a crosscut that encounters the lead when in 600 feet and is then driven 800 feet on the lead, showing a continuous ore body. The upper tunnel is in 1,200 feet and also opened large ore bodies. The higher grades of ore are being shipped, and extensive development is being done with a view to placing sufficient second-class ore in sight to warrant the erection on the ground of a concentrating plant. It is intended to sink a three-compartment shaft to a much greater depth than has been secured by the tunnel workings and exploration from the secured levels will be made to determine the continuity of the ore body and the values carried at the lower levels. The formation is granite and the strike of the lead is east and west. Mr. August Freeburg is superintendent at the works, and has accomplished over 300 feet of development during the present year. The system of timbering is sets and stulls and the stopes are filled.

THE JEFFERSON MINE.

The Jefferson group is owned and operated by the Jefferson Mining company, which, under the direction of Mr. A. H. S. Bird

the general manager, and Mr. Thomas Paul, the foreman, is doing extensive development work. The group consists of fourteen claims and is located three miles south of Corbin. A two-compartment shaft, timbered with 10x10 square timbers, has been sunk 400 feet, and is equipped with a 60 horsepower boiler and 10x12 Ledgerwood hoist and three-fourths inch steel cable. The company is now installing an air compressor plant that will derive its power by wire from the Missouri River Power company. The vein is a fissure varying in width from 20 to 100 feet, and has been discovered on the surface for over 3,000 feet. The ore is a copper sulphide.

THE COPPER BELL MINE.

This property is owned by Conrad & Co., and is now under lease and bond to John Macginnis & Company, who, with Mr. Daniel Dacy as foreman, are employing 20 men in the development and working of the property. A shaft has been sunk 115 feet, where it encounters the ore body, which has been explored a distance of 125 feet with a drift from that level. The equipment consists of a 60 horsepower steam hoist, steel cable, and a No. 7 Knowles pump for handling the water. The formation is granite and porphyry and the vein filling is a porphyry, the strike being east and west. The ore is a sulphide carrying its values in gold, silver, and copper. The property is located north of Basin on Cataract creek.

THE UNION MINE.

The Union mine is located one mile east of Elkhorn and is under bond to George Kent & Co., which commenced work about the first of this June and is now shipping 150 tons of ore a month to the East Helena smelters. The ore is an iron sulphide carrying gold, silver and lead. The vein has an eastern and western strike and a dip north of 65 degrees. The development consists of a 500-foot tunnel and an upraise to the surface, 100 feet of the work being done the present year. Seventeen men are employed.

THE M. & M. MINES.

This property is operated by the M.-M. company and lies 12 miles southwest of Rimini. Mr. Thomas Travis is the manager and employs 18 men in the development and operation of the mine. The property is worked through tunnels, the lowest of which is in 160 feet on the vein. The ore that is extracted from the surface cuts and upper works is conveyed through chutes to the lower tunnel and thence to the mill, which has 20 stamps and is equipped with Wilfley tables, which effect a very satisfactory saving, running 50 tons of ore a day. The company intends to enlarge the capacity of the plant in the near future. The ore is oxidized and the values are largely free.

THE BELL MINE.

The Bell mine is locally known as the Fleming mine, and is located in Warm Springs gulch six miles south of Alhambra Springs, and has been constantly in operation during the year. The main tunnel, which is 1,200 feet in length, 400 feet of which was constructed during this year, intersects the vein at a vertical depth of 500 feet. An upraise is now being constructed to connect with the upper tunnel to afford ventilation and exit. Little additional work is necessary to place a large amount of ore in sight, and the mine will soon be a regular producer.

THE BADGER MINE.

The Badger mine is located in the Corbin mining district, one mile north of the town of Corbin. The property is owned by the New Boston Mining company and is under lease and bond to Mr. J. H. McCabe and Col. Lloyd. A two-compartment shaft has been sunk to a depth of 125 feet, on an incline of 55 degrees on the vein, which shows a width of from twelve to fifteen feet. The ore is a sulphide carrying gold silver and copper. Development of the property will be continued until it is in a position to become a regular shipper. The workings are equipped with a Frazer & Chalmers steam hoist. The formation is porphyry and granite.

THE BUTTE CONSOLIDATED MINES.

The group of claims operated by the Butte Consolidated Mining company, of which Mr. Martin Mulvahill is the superintendent, is located one mile north of Corbin. An incline shaft has been sunk on the vein to a depth of 100 feet, and from that level a drift has been run 100 feet on the vein, exposing ore carrying silver and copper values. The shaft is equipped with a steam hoist and for the present only development work will be done. The country formation is granite and the vein is a fissure with porphyry gangue.

THE LEADVILLE MINING & SMELTING COMPANY.

The group being developed by this company, lies 14 miles west of Bernice and near the east line of Powell county. Work on the property was commenced during 1905, and a shaft equipped with a steam hoist and pump, has been sunk 100 feet and will be continued to 300 feet. Considerable exploration work has been done on the property aside from the construction of the shaft. Fourteen men are employed. The vein is in granite, is about thirty feet in width and strikes east and west. The ore is a concentrating character and the company is contemplating the erection of a plant to reduce it on the ground.

THE COPPER KING GROUP.

The group is located one and a half miles southwest of Corbin and is owned by Mr. R. C. Burton. Operations are conducted through an 80-foot incline shaft, sunk on the vein, and an 80-foot drift has been run west to determine the extent and value of the ore body penetrated. The incline will be put down to the 150-foot level and exploration carried on from that point. The property is equipped with a steam hoist and pump. Eight men are employed. The vein is in granite and porphyry.

THE KATY MINE.

This mine was originally prospected with a 150-foot shaft, and this has been repaired and an additional 50 feet added to its

depth during the present year, and from this level exploration drifts are being run. The property is in Lump Gulch, one and a half miles from Clancey, and is on the strike of the Liverpool, which has been a rich producer and is worked to a depth of 700 feet. The mine is owned and operated by Mr. John Hogan of Butte.

THE LITTLE DOTTE MINE.

The Little Dotte is located two miles northeast of Clancey, and is developed by an incline shaft 165 feet in depth and some drifting east and west on the vein. Most of this development has been accomplished during the present year. The formation is granite and the lead is on the strike of the Liverpool.

THE RELIANCE MINE.

The Reliance group is owned and operated by Resuel Bros. & Co., and is situated in High Ore gulch, five miles north of Basin. The property is developed by a tunnel 180 feet in length and a shaft 100 feet deep has been sunk below the tunnel level, and considerable development has been accomplished from the winze level. Several thousand tons of ore have been stoped. The ore values are in copper and gold.

THE CUSTER MINE.

Mr. George Fitchen of Butte is the owner of the Custer mine, which for the present is being worked by leasers, and these have recently opened up some rich silicious gold ore, shipments netting the leasers \$600 per car. The only development is that of a tunnel and the present work is almost wholly confined to the extraction of ore. The mine is one mile from Basin, on the south side of Basin creek.

THE HELPER MINE.

This claim is located one half mile south of Basin and is under lease and bond to Charles Whilley & Co. The property is de-

veloped by a 400-foot crosscut tunnel that cuts the vein at the same vertical depth, and from the intersection some drifting has been done, and an upraise made through the ore. The vein is from 3 to 5 feet in width has an east and west strike, and the product is a lead-silver concentrating ore.

THE BELMONT MINE.

This property is located north of Boulder and is developed by three tunnels, No. 1 securing the vein at a distance in of 300 feet, No. 2 at a distance of 200 feet and No. 3 at a distance of 100 feet. The vein is from 2 to 3 feet in width and is well defined. The ore is a high grade lead carbonate. The mine is under lease and bond to Moore & Grendell.

THE FLAG STAFF MINE.

The Flag Staff claim is located near the Minnesota, is owned by Mr. Peter McCloskey and has been developed by a 400-foot tunnel, run as a crosscut, and the vein has been quite extensively explored from the point of intersection and shows well in the face. The vein is well defined and with sufficient development promises to become a good producer.

THE NORMI MINE.

This claim is located on what is known as the Divide, between Clancey and Lump gulch, two and a half miles west of Clancey, and is being developed by Mr. John Kase and Dr. Salvail. The vein is a well defined fissure and has been prospected by a shaft 150 feet in depth and looks promising.

THE LITTLE DAVE MINE.

The Little Dave is located on the divide between Clancey and Lump gulch and is developed with a 90-foot shaft and a tunnel run in to tap the shaft and a 60-foot east drift. The vein is in granite, well defined and well mineralized.

Missoula County

The mineral areas of Missoula county are both extensive and attractive, offering as good opportunities to the prospector and to the capitalist as can be found in any of the mineral districts of the Rocky mountain ranges and while there are now prospects that there will be more activity in the quartz development the coming season, the precious metal output of the county the past year almost wholly was the product of her placer diggings. During the past season there has been some work done on several of the many fine prospects within the county, and there is promise that the next year will see some extensive and systematic development done.

The following is the production of metals for 1904.

Gold, fine ounces, 3,001.658—\$62,049.78.

Silver, fine ounces, 3,126.59—\$4,042.46.

The following is the production of metals for 1905:

Gold, fine ounces, 2,403.605—\$49,686.93.

Silver, fine ounces, 5,962.46—\$7,708.54.

Copper, fine pounds, 32,480.

THE CAPE NOME MINE.

The Cape Nome mine is owned and operated by Wilson & Webster, and is situated in the Wallace Mining district, five miles north of Clinton, on the Northern Pacific railway. Mr. Ole Erickson is in charge of the work being done, and eight men are regularly employed. The mine has a 300-foot shaft, but this is not being used at the present time, the development work that is now being done is in the construction of a series of tunnels to determine the continuity of the ore body, and to provide this method for the working of the property. The longest of these tunnels is now in 850 feet and displays a well-defined vein. A crosscut tunnel is being run that will encounter the vein at a vertical depth of over 300 feet. The formation of the country is granite, the strike of the vein is east and west and the width from 5 to 10 feet. The ore is a sulphide carrying copper and silver, the former being the principal value. Several car loads of the ore have been shipped. When the crosscut now

being run reaches the lead, an upraise will be made to the upper workings, and will afford ample ventilation. All the development work is done in the most substantial manner and the present outlook is that this property will soon be a regular and large producer.

THE BLACK HAWK MINE.

The Black Hawk group of claims is located in what is known as the Wallace mining district, is owned by the Largey estate, and is operated by Mr. Thomas McHugh, general manager, Mr. William Barry being the foreman. Eight men are employed. A two-compartment, 65-degree incline shaft has been sunk 200 feet during the year, and 130 feet of drifting was done from that level. This work opened a large body of copper ore, and the incline is now being put down another 100 feet, and when that level is secured, it is planned to make extensive level exploration with a view to ascertaining the extent of the ore body and the values carried at that level. The shaft is timbered with 8x8 square timbers and at present is equipped with a bucket hoist. This will be exchanged for a skip or cage when the 300-foot level is secured. The power is furnished by a steam hoist of the Webster-Camp make and a $\frac{7}{8}$ round steel cable. The ventilation of the mine is good and every precaution is taken to prevent accidents. The country formation is granite and porphyry and there is every indication that the leads will secure rich copper ore when depth is attained.

THE HIDDEN TREASURE GROUP.

This property is situated about three miles north of Clinton, a small station on the main line of the Northern Pacific railway. The mine is opened by two tunnels, No. 1, 550 feet in length and No. 2, 1,600 feet in length. An upraise will be made connecting the tunnel levels, affording means of escape and ventilation, this being done at the instance of the inspector, who found the air of the lower tunnel much vitiated, an ineffectual attempt being made to ventilate the long tunnel by means of a small fan and zinc pipe. The upraise will be 220 feet in length. Ore is being stoped from the upper level, and

an aupraise to the surface is being made for air and exit. The management has done a large amount of exploring on the property in drifting on the vein, and a 700-foot crosscut is now being run to tap the south ore body. Shipments are being regularly made to the Tacoma smelters. The country formation is granite, with a capping of quartzite and lime, the strike of the vein is east and west and is in a matrix of slate and gneiss, the former at present being the hanging wall and the latter the foot wall. The ore is a sulphide carrying copper, silver and lead values. The formation is hard and solid and does not require close or heavy timbering stulls are being used in the stopes and sets in the tunnels. The property is owned and operated by Mr. W. J. Stevens of Missoula, who is general manager, and Mr. C. A. Ruscle is the foreman at the works. Sixteen men are employed.

THE AMADORE MINES.

The Amadore group of mines is located twelve miles southwest of Iron mountain, in the Bitter Root range. There are fourteen claims in the group, which is owned and operated by the Amadore Mining and Development company, Mr. D. E. McKinnon being the general manager and Mr. Charles Huller the superintendent. At the intersection of a crosscut tunnel and the vein, a two-compartment winze has been sunk 700 feet, securing a total vertical depth of nearly 1,200 feet. This shaft is equipped with a 10x12 Hendry steam hoist, a one-inch round steel cable and two single-deck cages with all safety appliances. A Liner compressor furnishes the air for the machine drills. There is 1,500 feet of development on the vein, 300 feet of which was made during the present year. An 800-foot drift that has been constructed on the 400-foot level has exposed large bodies of ore. A double compartment raise is now being made from the lower tunnel level to the surface, connecting the surface with the winze, and when this is completed all work will be done through this shaft, which will be elaborately equipped for rapid work, and the motive power for the works will be electricity. The company has constructed a railway from the mines to the town of Amadore, a distance of 12 miles, and contemplates the erection of a smelting plant four miles from the mines. The formation of the country in the vicinity of the mines is granite, the lead

has an east and west strike and is from 10 to 20 feet in width. The values in the ore are gold and copper. Twenty men are employed in the mines. With the improvements being made, the mine will be well ventilated.

THE TAR BOX MINE.

The Tar Box mine is located four miles west of Salteese and is owned and operated by the Salteese Mining company. Mr. Richard Joy is the foreman and employs thirty men. A two-compartment shaft has been sunk to a depth of 400 feet, and from a drift 300 feet east of the shaft a winze was sunk 200 feet and secured the vein at a total vertical depth of 600 feet, the construction of the winze being accomplished during the present year. The principal work now being done is in the line of development and the blocking out of ore, which is lead-silver and has increased its values constantly as depth has been secured. The company intends to erect a 150-ton concentrator for the reduction of the mine output. The vein is from 8 to 20 feet in width, and has an east and west strike and a dip of forty degrees. The country formation is porphyritic granite and diorite, is soft and requires close timbering. The workings are equipped with a Ledgerwood 8x10 steam hoist and all necessary appliances and conveniences. The mine is in fair condition and with some changes requested, will be safe and well ventilated. The immediate district is in the direct strike east of the famous Couer d'Alene mining district.

THE IRON MOUNTAIN MINES.

This property is located northwest of Iron Mountain, a station on the main line of the Northern Pacific railway between Missoula and Wallace, Idaho. The mine has been closed for six years, but when in operation was a great producer. The property is now in the hands of the Iron Mountain Tunnel Site company, which is driving a tunnel that will be 5,500 feet in length when it intersects the vein at a depth of 1,700 feet. The construction of this tunnel was commenced last year and has been pushed with constant vigor and is now in over 2,000 feet. The working equipment consists of an Ingersoll compressor,

located a short distance from the portal of the tunnel. The company is erecting a 200-ton concentrator and a smelting plant. Twenty-three men are employed. Mr. M. L. Hewitt is the general manager and Mr. W. K. Edwards is the superintendent of the company.

THE NATIONAL MINE AND MILLING COMPANY.

The property of this company is located four miles west of Salteese, on the Couer d'Alene branch of the Northern Pacific railway. A tunnel is being driven on the Bald Mountain claim that at 1,200 feet in length will encounter the lead at a vertical depth of 700 feet. A double-compartment shaft, which has been put down 200 feet during the present year, is being sunk on the National claim, and from the levels of this shaft development drifts will be run. The company is operating systematically and is doing much to demonstrate the bright future that is in store for the district. Mr. E. W. Conrad is the general manager of the company, and employs eight men in the development work now under progress.

Lewis and Clark County

Though Lewis and Clark county has a great area of mineral ground bearing gold, silver, lead and copper, with the former largely predominating, and offers as attractive opportunities for successful development of large and profitable producing mines, activity in mining during the present year has not been as great as it should have been or as lively as anticipated. The Drumlummon was operated during a part of 1905, when it was closed down by litigation that involved the ore bodies that were being worked and ground that it was intended to explore, the later operations being confined to the extraction of ore from the upper levels, the lower workings of the mine having been permitted to fill with water. The ores extracted were treated at the 60-stamp mill on the property that has been in constant operation for the past twenty years, and during the past couple of years the tailings that have been accumulating during all this long run have been worked through a cyanide plant having a capacity

of 400 tons per day, and being the second largest plant of the kind in the state. The Rimini district situated about 18 miles southwest of Helena comprises a large mineral zone, the principal area lying along the side of Red Mountain. The east end of the mountain is cut by a great porphyry dyke on which a company in which Mr. J. J. Mill is the principal owner, has 25 patented claims, and though they are practically undeveloped, the group has a good showing. There is little systematic development work being done in the district at this time, the majority of efforts being by leasers who are simply in quest of shipping ores, and in this line about 75 men are employed and the ore output per month runs from 400 to 500 tons. There are many prospects in the district that certainly warrant development and seem to present in their present stage ample assurance of success. Lewis and Clark county should and will be one of the richest and most productive of the mineral areas of Montana, and all that is necessary to make this become an active fact, is for capital to be invested in the proper development of its many hundreds of promising gold, silver and copper prospects.

The following is the production of metals for 1904:

Gold, fine ounces, 30,696.219—\$634,547.16.

Silver, fine ounces, 172,805.83—\$223,425.72.

Copper, fine pounds, 17,067.

Lead, fine pounds, 67,688.

The following is the production of metals for 1905:

Gold, fine ounces, 30,660.141—\$633,801.36.

Silver, fine ounces, 170,412.12—\$220,333.80.

Copper, fine pounds, 14,300.

Lead, fine pounds, 125,540.

THE WHITLATCH MINES.

The Whitlatch mines, located five miles south of Helena, at Unionville, are owned and operated by the National Mining and Exploration company, Mr. Frank L. Sizer being the manager and superintendent in charge, and Mr. Peter Mack, the foreman. Seventy men are given regular employment on the property. The development of the property was accomplished during last and this year, a two-compartment shaft having been put down 500 feet an east and west drift has been run 300 feet in ore on

the 400-foot level, and raises made to upper levels, the total development comprising over 1,400 feet of work. The mine is well timbered and ventilated and all precautions have been taken to prevent accidents. The workings are equipped with a steam hoist and two singledeck cages that have all safety appliances a $\frac{3}{4}$ -inch cable and a 6-drill Ingersoll compressor. A 20-stamp mill has been erected about 500 yards from the mine and the ore is conveyed to it with a gravity tram. The mill is a combination amalgamation and concentrating plant and is thoroughly modern in every appointment, making the highest possible saving of values from the 75 tons of ore worked daily. The formation of the country is granite and the strike of the vein is east and west. The vein filling is an altered lime and porphyry, the ore, a sulphide carrying gold values.

THE SPRING HILL MINES.

The Spring Hill mines are located in Grizzly gulch, four miles south of Helena, and are owned and operated by the Pittsburgh-Montana Copper Mining company, Mr. W. P. Parker being the general superintendent in charge, and employing 65 men. The mine is worked through a 900-foot tunnel that was driven in development of the property during last and the present year. An upraise was made from the tunnel to the surface, a distance of 250 feet, for ventilation and exit in case of necessity. The system of timbering is square sets and stulls and the stopes are back-filled. The country formation is hard and does not require close timbering to make the ground safe. The equipment consists of boilers and an Ingersoll-Sargent 7-drill compressor the plant being located about a half mile from the mine and just above the level of the gulch. The air is conveyed by pipe line to a receiver located at the mine. The output of the mines, which is shipped to the company's smelters at Butte, is from 700 to 800 tons per month. The ore is a sulphide that runs up to 67 per cent in iron and 30 per cent sulphur, and being used for the double purpose of fuel and fluxing. The immediate vicinity is lime and porphyry, with intrusions of diorite. In the mine the ore lies in large chambers close to the contact, and is displaced frequently with crossfaults. Advance development has been carried on extensively during the year.

THE JAY GOULD MINE.

This property is operated by the Gould Mines company, and is located 27 miles northwest of Helena. Mr. F. A. Schiertze is the superintendent and Mr. John Watson the foreman. The mine is operated through tunnel and shaft workings. From the tunnel level a two-compartment shaft has been sunk 200 feet and some 2,300 feet of levels run on the strike of the vein, 150 feet of this drifting being done during the present year. The main tunnel is run in as a crosscut, intersecting the vein at 1,000 feet and a vertical depth of 500 feet. The ore carries the most of its values in free gold and what is not saved through amalgamation is secured through cyaniding. The mine is equipped with an 8x10 Ledgerwood hoist, a Rand Imperial compressor that furnishes the power for the drills, and a 125-ton mill and cyanide plant which is located about 100 feet from the portal of the working tunnel. The mine is in good condition, well timbered with sets and stulls, and the ventilation is accomplished with many connections between the several levels. Protection against fire is provided by a large tank erected near the mouth of the tunnel. One hundred men are given employment on the property.

THE HONEY COMB MINE.

The Honey Comb group is situated three miles west of Marysville, and is operated by the Honey Comb Mining company. An incline shaft has been sunk 200 feet for prospecting purposes, and is equipped with a 7x12 Fraser-Chalmer steam hoist and $\frac{5}{8}$ -inch steel cable. Considerable drifting has been done east and west from shaft levels, the work being confined wholly to exploration and the development of ore bodies. The strike of the vein is east and west, the vein being in slate. The ore is free-milling gold.

THE COLUMBIA MINE.

The Columbia group of mines, locally known as the Porphyry dyke, is composed of 14 claims located seven miles west of Rimini, and is owned by Mr. James Breen. The property was first

prospected on the surface with opencuts from which ore was milled, and with some shallow tunnels. Under the present ownership a tunnel was started much lower down and has been run west and at an angle across the dyke this tunnel now being in over 1,600 feet. During the latter part of this summer the dyke was also quite extensively prospected on its west end with churn and diamond drills, but this work was discontinued with the coming of snow. Work is still being pushed in the tunnel, which now has a vertical depth of over 300 feet. All the work done under the present ownership has been with a view to demonstrating average values of the ore. Six men are now engaged in the extension of the tunnel. The vein runs up to 1,000 feet in width, lies in granite and has a north and south strike. The surface ore is free-milling, but iron sulphides come in with depth. This is one of the largest porphyry veins in the state that contains workable values.

THE TWIN CITY MINES.

This group of claims is located twelve miles south of Elliston and is operated by the Twin City Mining company. Mr. A. McNaughton is the manager and Mr. Sam Moore is the foreman. During the past summer a two-compartment shaft was put down 100 feet, and 100 feet of drifting was done on the vein from the attained level, opening an ore body that is yielding a regular output of ore that is being shipped to the Beatrice company mill for treatment. The ore is a sulphide carrying gold, silver lead and copper and concentrates easily and closely. Ten men are employed in the mine.

THE RED BIRD MINE.

The Red Bird mine is located in Greenhorn gulch, about 12 miles west of Helena, and has been in continuous operation during the past two years. The property is developed with a 500-foot shaft and considerable drifting and crosscutting. The mine is equipped with a steam hoist and skip, the Ledgerwood hoist having a 7½-inch steel cable. The mine produces iron, lead and copper ores, the iron being shipped to the smelters at East Helena and the copper ore to Butte for treatment. The forma-



tion of the vicinity is lime and porphyry and the general strike of the vein is east and west, being very erratic in its course and the ore occurring in large chambers. The property has the indications of becoming a good producer when depth is attained. Thirty-five men are employed. Mr. A. A. Pellitier is the general manager and Mr. George Webster is the foreman at the mines.

THE SIBLEY MINE.

The Sibley mine is situated two miles southeast of Marysville and is owned and operated by Trampler Bros. The mine is developed by a crosscut tunnel that was driven 400 feet, where it secured the vein, and from this point a drift was run 125 feet and an upraise was made on the vein 125 feet to the surface, this development revealing a large body of ore. The owners have erected a 2-stamp mill with which to test the ores, and after ascertaining the best process of treatment, will put in a mill to work the output of the mine, upon which development is continually being prosecuted. The formation is lime and porphyry and is soft, requiring close timbering. The vein averages from 3 to 6 feet in width, the ore carrying gold values.

THE HELENA MINE.

The Helena mine, owned and operated by Mr. James Smith, is located seven miles northwest of Helena, and is developed by an incline shaft that is down 200 feet, and some 350 feet of drift has been run on the vein from the lowest level, proving the continuity of the ore body at that depth. An upraise has been made to the surface, which secures good ventilation and a means of exit. The workings are equipped with an 8x10 Ledger hoist and $\frac{3}{4}$ -inch round steel cable and bucket. The strike of the vein is east and west and the sulphide ores carry gold, silver and lead and are showing indications of copper. Ore shipments are regularly made to the East Helena smelters. Eight men are employed at the mine. Mr. John McElry is the foreman.

THE BESSIE MINE.

The Bessie mine is located two and a half miles northeast of Austin and is owned by Messrs. Edward Geyson, Gus. Johnson and Thomas Loyal. A tunnel 300 feet in length has been driven to tap the vein and a shaft has been sunk 50 feet on the lead, and the extraction of ore from a drift run from the tunnel level has provided regular shipments that have been made to the East Helena smelters. The ore is in blue lime and has an east and west strike; the filling is porphyritic and the ore occurs in chambers. Values are increasing with depth.

THE VALLEY FORGE MINE.

The Valley Forge mine is located at Rimini and is owned by the Valley Forge Mining company. The property is developed with tunnels, No. 2 of which is in the ore 380 feet, and shipments of 300 tons per month are being made. The ore is a sulphide carrying gold, silver and lead, the latter value running up to 40 per cent. The present owners are now running a lower tunnel that will require a length of 1385 feet to reach the developed ore body, and when this is completed the upper workings will be connected with a raise and the ores will be sent out through this level. The formation is granite and porphyry and the strike of the vein is east and west. Mr. George D. Corchran is the manager and Mr. E. G. Swan is the foreman. Twenty men are employed.

THE BROOKLYN BRIDGE MINE.

The Brooklyn Bridge Mining company operated this property during all of 1905 and part of the present year employing 15 men. It is the intention of the company to unwater and set the property to operating again in the near future. Considerable development has been done on the vein but as yet it has not penetrated through the iron capping, where it is expected the permanent ore bodies will be secured. The mine is equipped with a 50-horse power steam hoist, a steel cable and a pumping plant. The mine has been developed under the management of Mr. John Kruger and Mr. Peter Dowling as foreman.

THE BALD BUTTE MINES.

The Bald Butte group is located at Bald Butte and is owned and operated by the Bald Butte Mining company, Mr. John Edgerton being the general manager and Mr. James H. Kitto the foreman. The main development is a tunnel 2,300 feet in length and that secures a depth of 1,200 feet under the apex of the mountain, and there has been extensive development of the ore bodies from the tunnel level. A shaft 200 feet in depth has been sunk from the tunnel level, but this ground is not being explored at this time. Over 500 feet of new development has been accomplished during the present year and the new ground explored has brought the most satisfactory results. The company has a 50-ton mill located about a mile from the mine and a crusher located at the workings, the ore, as it comes from the mine, being crushed and then transported to the mill for treatment. All machinery is operated by electric power. Thirty men are given employment at the mine and mill. The formation of the immediate vicinity is slate and gneiss and the strike of the vein is east and west. The ore is free-milling gold. The ore reserves are kept well ahead of the extraction.

THE CAPLICE MINE.

Situated directly three miles north of Rimini is the Caplice group of claims, owned by the Caplice estate and the Daily Brothers. A tunnel, of which 100 feet was constructed during the present year, has been driven 400 feet on the vein, and a shaft has been sunk 65 feet below the tunnel level. About 60 tons of ore is shipped per month to the East Helena smelters. The country rock is porphyry and granite, and in this vicinity is considerably faulted. The strike of the lead is north and south, and as the formation in places is soft, requires close timbering in the workings. The ore is a galena carrying good values in gold, silver and lead. The style of timbering is stulls and sets and the stopes are filled.

THE BIG OX MINES.

The Bix Ox mines consist of a large group of claims located north of Marysville, and the principal development of the group

is on the Big and Little Ox claims. The development on the Little Ox consists of three tunnels driven on the vein respectively 75, 250 and 650 feet, and upraises made connecting these levels, affording ample air and means of exit. Of this work, nearly 400 feet was constructed during the present year. A crosscut tunnel is now being run in to tap the vein at a depth of 600 feet, and when this is completed development workings will be constructed that will connect with the other levels and the product of the mine will be brought through this tunnel. Over 300 feet of the tunnel has been driven during this year. The company has a mill that is located a short distance from the mine, and anticipates that when the present development plan is completed there will be an abundance of ore in sight and that the mill will then be placed in operation for a long steady run. The ore is a sulphide carrying gold and silver. Mr. C. J. Fulton is the general manager of the company.

THE NORTH STAR MINE.

The property is located in the Marysville district and is owned and operated by Mr. Thos. Cruse of Helena. Mr. Mike Hurley is the superintendent at the mine and employs 14 men. Present operations are confined to development, an incline shaft having been sunk 400 feet, being operated with a horse whim. The country formation is diorite and slate and the ore is a free-milling oxide. Most of the development was accomplished during the present year.

THE HOWARD MINE.

The Howard mine is located in Grizzly gulch, one and a half miles south of Helena, and is operated by the Howard Mining company, Mr. C. A. Sheldon being the superintendent. A tunnel 360 feet in length has been driven on the lead, and a shaft has been sunk on an incline to a depth of 140 feet below the tunnel level, and from the attained depth about 100 feet of drifting has been done on the lead, securing some very high grade bodies of iron carbonate ore carrying gold. Shipments of about 150 tons per month are made to the East Helena smelters. The mine is in very promising condition.

THE JUMBO MINE.

This property is owned by Mr. E. R. Tandy and is situated about two miles south of Helena, in Dry gulch, and is at present being operated under a lease and making regular shipments to the East Helena smelters. The ore is an iron oxide running well in gold and lead. The property is developed with a 700-foot tunnel.

THE HUBBARD MINE.

The Hubbard mine is located in the Jay Gould mining district and is owned and operated by Messrs. Byrnes & Whitcomb, who for the present are working the property in a limited way, employing 20 men. The property has been worked through a series of tunnels, the longest of which is 1,000 feet, and some 1,900 feet of drifting has been done on the vein. There is a 10-stamp mill and cyanide plant, with a capacity of 30 tons per day, on the property. The present owners are making preparations to perform extensive development work and expect shortly to place the mill in operation, and, with an abundance of ore in sight, keep it running steadily in the future. The property has been idle for some time.

THE BELMONT MINES.

This group of claims is situated a short distance west of Marysville and is owned by the Penobscot Mining company. The property has a record of producing a couple of million dollars in profits and for a number of years produced an average of 1,000 tons of ore per month, which was treated at a mill and cyanide plant located on the property. The saving of values made by the mill is claimed to have been from 98 to 99 per cent. The property was in operation during 1905, giving employment to 30 men, but has not been in operation during the present year.

THE PIEGAN-GLOSTER MINE.

During the past year the Piegan and the Gloster groups of mining claims, situated northwest of Marysville, have been

consolidated and are being systematically developed. The Gloster has a record as a producer in former days, having been worked in a continuous chute about 800 feet in length and some 600 feet in depth, the ore varying from 3 to 12 feet in width. The Piegan had some surface workings and produced some good ore. Both properties have remained idle for some years, owing to litigation, but this has been adjusted, and under the present ownership the property on the Piegan end is being extensively and systematically developed by a series of tunnels, the lower one of which is now in on the vein 1,200 feet, and at 750 feet in a winze has been put down 750 feet, these workings uncovering considerable ore. The vein is in granite with slate matrix.

THE SILVER BELL MINE.

The Silver Bell claim is located in the Marysville district and is owned by Mr. Thos. Cruse, who is having the property developed. The lead is well defined and mineralized and promises to develop into a producer. The Jerosia mine is in the same ownership and located near Marysville. The claim is being operated under a lease and is making regular shipments of high grade ore to the East Helena smelters.

THE MONTEZUMA MINE.

This property is situated two miles southeast of Rimini and is owned and operated by Meessrs. Whaley & McDonald. Two shafts have been sunk on the property to a depth of 150 feet each and these have been connected for ventilation and means of egress. Some 300 feet of drifting has been done from the shaft levels and regular shipments of ore are being made. The ore is a sulphide carrying gold, silver and lead.

Madison County

In its mineral possibilities Madison county ranks with the most favored mining areas of the state, and its ore-bearing sections are not limited to any particular district, as at least two-thirds of the county is more or less mineralized ground, and the most of it very pronouncedly so. In almost every locality that has been at all exploited, there are producing mines. The principal mineral bearing belt is the Tobacco range of mountains which traverses the county through its center from north to south. Along the eastern part of the county is the Madison range, and paralleling the Tobacco range on the west is the Ruby range. These ranges occupy practically all of the county with the exception of the southwest corner. The county approximately is 100 miles long, running north and south, and 50 miles wide, and the greater part of it is easily accessible by rail. The districts most easily reached, from Whitehall on the north to Alder gulch on the south, a distance of about 60 miles, has been superficially prospected and there has been considerable development accomplished, though no deep levels have been attained. With but the shallow development of prospecting, however, a large number of properties have been made producers, and these have in no inconsiderable amount contributed to the ore output of the mines of the state. The leads of this area are gold-producing, with silver as a by-product. Aside from the producing mines, there are a number of prospects that are now being extensively developed and which promise to be brought in as large and regular producers and that will place Madison county in the front rank of mining counties. During the past year there has been considerable activity in development at the Sand Creek, Pony, Red Bluff, Norris, and Richmond Flats camps, and the results have been very generally most favorable.

The following is the production of metals for 1904:

Gold, fine ounces, 41,241.281—\$852,532.94.

Silver, fine ounces, 149,085.81—\$192,722.50.

Copper, fine pounds, 15,815.

Lead, fine pounds, 540,682.

The following is the production of metals for 1905:

Gold, fine ounces, 36,604.950—\$752,598.45.

Silver, fine ounces, 135,231.90—\$174,845.28.

Copper, fine pounds, 23,114.

Lead, fine pounds, 243,308.

THE GREEN-CAMPBELL MINES.

The Green-Campbell Mining company mines consist of ten claims that are situated three miles west of Silver Star. Mr. Edward B. Howell is the president of the company and Mr. B. C. Leason is the superintendent of the mines. The main vein of the group was first prospected 35 years ago with a crosscut tunnel that tapped the vein at a depth of 125 feet and from which point some little exploring was done. The present owners have developed the vein with a shaft 400 feet deep, sunk on an incline of 30 degrees, most of the work being done during the present year. The shaft is equipped with a 12x14 Ledgerwood hoist, an automatic skip and an electric Ingersoll-Sargent compressor. Some 600 feet of drifting has been done from the shaft levels and connections in the workings have been made with upraises. The company has erected a 100-ton Sherman mill for the reduction of the mine ores, that is conveniently located and will have the output conveyed to it by the skips, avoiding the necessity of transfer and handling. The mine is in good condition and well ventilated; the stopes are filled.

THE MAMMOTH MINES.

The Mammoth mines are situated twenty miles south of Jefferson Island and on the summit of the Tobacco range, and are operated by the Mammoth Mining & Power company, Mr. A. C. Sanders being the general manager and Mr. John W. Cook, the foreman. Thirty men are employed in development and working. Development is secured and ores are extracted through a series of tunnels that range in length from 300 to 700 feet, and the company is planning to drive a lower tunnel a distance of 3,000 feet, securing a maximum vertical depth of 700 feet. The formation of the country is gneiss and porphyritic granite and the lead is well defined and runs in widths from 3 to 15 feet, producing an iron oxide ore carrying gold, silver and copper values. The company has recently constructed a 100-ton concentrator that is equipped with eight Wilfley tables, crushers and

A VIEW OF VIRGINIA CITY





rolls, the plant being complete and modern in every appointment. The ore output of the mine is transferred to the mill by aerial tram. All machinery is driven with electric power.

THE KERSARGE AND ROUGH RIDER MINES.

This consists of a group of claims lying seven miles south of Virginia City and is operated by Hon. E. W. King and Mr. M. S. Largey, who are developing the group under an option from the Alder Mining company. Mr. E. H. Macdonald is the superintendent and Mr. James Harkins is the foreman. There are 45 men constantly employed in the development and working of the mine. During the past two years very extensive development has been accomplished and the property made a large and regular producer. In the line of development, one tunnel 600 feet in length and another 1,000 feet and over 300 feet of crosscutting and the sinking of two shafts and considerable drifting from these has been accomplished, and a large tonnage of sulphide ores carrying gold values has been placed in sight. The main shaft is two-compartment, and is timbered with 10x10 timbers, and is equipped with a 10x14 Chalmers engine and hoist and a one-inch round steel cable. A 60-stamp mill with 150-ton cyanide plant has been installed at a cost of \$70,000.

THE REVENUE AND MONITOR GROUP.

These mines are located six miles south of Norris and on what is locally designated as the south side of the Tobacco Root range. The mines are operated by the Montana Revenue Gold Mining company, of which Mr. Rodger C. Knox is the general manager, and Mr. Edward Williams is foreman. The formation of the country is a secondary granitic porphyry and the vein lies at a dip of from 20 to 30 degrees, with an easterly and westerly strike, the present development producing an oxide ore carrying gold and silver values. During the past year the company has been prosecuting development, having constructed over 500 feet of drifting on the vein on the lower levels. The double-compartment shaft is equipped with an 8x10 Tumbler friction hoist, single deck cage and 7/8-inch steel cable. There is a mill on the property and the company has recently added a cyaniding

plant with a capacity of 100 tons per day, for the treatment of the output of the mines. For some time the ore extracted has been taken out by leasers, and this has been treated intermittently at the mill. The mine is well timbered, has three exits and is well ventilated. Thirty men are employed in development work.

THE GARNET MINE.

The Garnet group is situated west of Poney and is operated by the Garnet Gold Mining company. Mr. F. L. Ballou is the general manager and superintendent and is employing 44 men in the operation and development of the property. The mine is developed with tunnels, one having been driven 1,200 feet as a crosscut, at which depth it encountered the lead, and from this point the lead has been penetrated 700 feet east and west, and stoping has been in progress from this level. An upraise has been in course of construction that, when completed, will connect the upper workings and afford ample escape and ventilation. The development of the ore bodies is being carried far ahead of the extraction over 3,000 feet of exploration work having been accomplished during the past two years. The vein is a true fissure with an easterly and westerly strike and runs in the neighborhood of 20 feet in width, the ore product being a sulphide carrying gold, copper and silver values. The country formation is granite and porphyry. There is a twenty-stamp mill on the property, and this is to be greatly enlarged so as to handle the increased output of ore. The mill is operated with electric power.

THE CLIPPER AND BOSS TWEED GROUP.

The Clipper and Boss Tweed mines are situated three miles north of Pony, on the summit of the Tobacco Root range, and are owned by the Madison Gold Mining company and operated by the Morris and Elling estate, Mr. William Morris being the general manager and Mr. James Wilkey the foreman. Twenty men are employed on the property, which is worked through a series of tunnels, most of the work being done at this time being the extraction of ores from the upper levels, and treating them at a 20 stamp mill located about a mile from the Clipper and

owned by the operators. The product of the vein is a sulphide carrying gold and some silver, the values running from \$5.00 to \$7.00 per ton. The country formation is gneiss, lime and granite and is very hard, requiring little mine timbering. The workings are well ventilated. The operating company is intending to consolidate the two groups and erect a 100-ton stamp mill and cyanide plant on the property, and in this way not only provide for handling much more ore and with greater convenience, but also abolish the established haulage charge that is now necessitated by the distant location of the present mill.

THE HECLA GROUP.

The Hecla group consists of seven claims located five miles southeast of Norris, the group being operated by the Montana-Hecla Mining company. Mr. William Bluff is the superintendent and employs 15 men. The incline shaft has reached a depth of 200 feet, 130 feet of which was constructed during the present year, and the development of the vein from the tunnel levels is being prosecuted. It is the intention of the company to install equipment necessary for development 600 feet in depth.

THE EASTON MINE.

This property is owned by the Elling estate and is situated six miles south of Virginia City and has been in constant operation during the past two years, employing forty men. The surface ores are developed with a tunnel 2,200 feet in length, and deeper development has been secured by the sinking of a shaft 300 feet, securing a vertical vein depth of 450 feet, and from which level considerable exploring has been done. The shaft is protected with 10x10 timbers and is equipped with a 12x15 Ledgerwood hoist and cages with safety appliances. The several levels are well connected so that there is ample exit opportunity and good ventilation. The mine output is now treated at a 25-ton plant, but the capacity of the mill is to be largely increased in the near future. The country formation is porphyritic granite and gneiss and the vein is a persistent fissure producing sulphide ores carrying gold and silver values.

THE PACIFIC MINES.

The Pacific mine is owned by the Elling estate and is located seven miles south of Virginia City. It is worked through tunnels, the main one of which is 1,600 feet in length and has encountered some very large ore bodies. A lower tunnel has been driven on the vein and secures a vertical depth of 500 feet. Over 1,000 feet in tunneling, crosscutting and upraising has been accomplished during the year, connecting the workings and affording good ventilation and exits. The mine is timbered with square and tunnel sets and the stoping ground is filled. The strike of the veins are northeast and southwest and dip to the southeast; the country formation is gneiss and schist; the ore is a sulphide carrying gold and silver. The product of the mine is treated at the Easton mill. Mr. J. H. Pankey is the superintendent and employs 18 men.

THE LEHIGH MINING COMPANY MINES.

This property is owned by Mr. Hugh Elliot, and is located at the head of Meadow gulch. Mr. John Elliot is the foreman of the mine and employs 26 men. The property is developed with a two-compartment shaft that is down on an incline of 45 degrees and several hundred feet of drifting on the vein has been done. There was 650 feet of the development accomplished during the present year and the levels connected so that the ventilation of the workings is now good. The vein is a well defined fissure and has an easterly and westerly strike, cutting a country formation of gneiss, porphyry and granite. The most of the development work now being prosecuted is the extension of a tunnel that will secure a vertical depth of 300 feet.

COPPER CHIEF MINES.

The Copper Chief mines consist of a group of five claims that are located three miles west of Silver Star, and are operated by the Copper Chief Mining company, Mr. F. M. Longshore being the superintendent and Mr. C. R. Whipple the foreman. Ten men are employed. A shaft 160 feet deep has been sunk on the lead on the Copper Chief during the present year and the shaft

has been equipped with a 7x13 Bradley steam hoist and round steel cable. From the bottom of the shaft the lead has been drifted upon for a distance of 100 feet, and copper ore brought into sight. It is the intention of the company to continue the shaft down to the 500-foot level, from which point the lead will be extensively explored. The formation of the vicinity is granite.

THE COLORADO MINES.

This property is situated south of Whitehall and is owned and operated by the Colorado Mining company. The mine is developed with a 220-foot shaft and over 700 feet of drifting and cross-cutting and an upraise to the surface for exit and ventilation is now under construction. About 700 feet of the exploration work has been accomplished during the past two years. The workings are equipped with a steam Ledgerwood hoist and five-eighths steel cable and cage. The strike of the vein is east and west and the vein filling is porphyry and talc, the ore being free gold. The shipments run at about 100 tons per month. Mr. J. T. Pluett is the superintendent.

THE U. S. GRANT GROUP.

The Grant group is operated through a series of tunnels ranging from 760 to 800 feet in length, and the levels are connected with raises, affording ample ventilation and opportunity for escape. The ore developed is a high grade free gold iron oxide, and shipments of several hundred tons are made monthly. The strike of the vein is east and west and penetrates a black gneiss formation. The property is located one mile south of Virginia City and is operated under lease by Mr. F. D. Malone, who is employing seven men in the workings.

THE ALMEDA MINE.

This property is owned by the Westinghouse Mining company and is being operated under lease by Mr. J. H. Pankey and Mr. C. D. Groves, who are giving steady employment to seven men. The workings are equipped with a 40 horsepower boiler that fur-

nishes the power for the machine drills with which development is prosecuted. The ore is an iron oxide carrying gold values, and extraction is going on regularly, shipments of the mine output being made to the smelters. The mine is operated through tunnels, the longest of which has penetrated the lead to a length of 600 feet. The mines are located two miles south of Virginia City.

THE WEST MAYFLOWER MINE.

The mines are owned by Hon. W. A. Clark and are being operated under lease by Mr. James Reynolds, who, with seven men, has recently been extracting surface ores making regular shipments of about forty tons per month. The mine is developed with a tunnel.

THE BROADWAY MINE.

The Broadway mine is situated two and one-half miles southwest of Silver Star, and after being shut down for some years, is now, under lease, making regular shipments of high grade ore to the smelters at East Helena, the ore being extracted from the upper workings, the lower levels, which are down on an incline of 650 feet, being filled with water. The hoisting for the present is done with a horse whim. The workings are well ventilated and two escapes are provided. The vein is a well defined fissure.

THE NOBLE MINES.

This property has been worked intermittently for many years and has a large production of ore to its credit. The mine is located on Wisconsin creek, seven miles north of Sheridan, and is being worked by a company of miners and making regular shipments of high grade ore carrying gold, silver and some copper. Fifteen men are working the mine.

THE MORNING STAR.

The district in the immediate vicinity of this property gives every evidence of good mineral leads, but as yet has not received

the development necessary to demonstrate its possibilities. The country formation is gneiss, granite and lime. The Morning Star is located four miles west of Silver Star and is leased to Mr. Scott Williams and Mr. William Miller, who are making regular shipments of high grade ore to the East Helena smelters. The mine is operated through a shaft 150 feet in depth and equipped with a horse whim.

THE SHAFTER MINE.

The Shafter mine is situated 12 miles south of Virginia City, and is being operated by Mr. T. B. Salsburg. The mine is developed with two tunnels, one 700 feet and the other 1,000 feet in length. Three hundred feet of this development has been accomplished during the present year. The shorter tunnel has secured a vertical depth of 300 feet and opened some large bodies of high grade ore, from which regular shipments are made to the East Helena smelters. The longer tunnel secures an additional depth of 100 feet.

THE BOLOGNE MINE.

This property is also located twelve miles south of Virginia City and is owned by the Demears Gold Mining company, which has patented 16 claims, all of which show well defined veins carrying gold and silver values.

Meagher County.

Though some parts of Meagher county afford as good opportunities as can be found for mineral prospecting and development, there has been practically no activity in mining during the past two years. The copper property owned by the Marcus Daly estate at Copperopolis, has been closed down indefinitely, the development workings being allowed to fill with water, and the camp is practically deserted, and the only mining going on in the neighborhood is such as is being prosecuted by local leasers. At Castle, a silver-lead camp, a number of leasers have been continuing work, having faith that the future will bring them improved markets, and it is a pleasure to know that they are now

being rewarded with better values for both metals.

The following is the production of metals for 1904:

Gold, fine ounces, 333.590—\$6,895.92.

Silver, fine ounces, 3,011.97—\$3,894.26.

The following is the production of metals for 1905:

Gold, fine ounces, 75.600—\$1,562.79.

Silver, fine ounces, 9.26—\$11.97.

THE BLUE-EYED NELL.

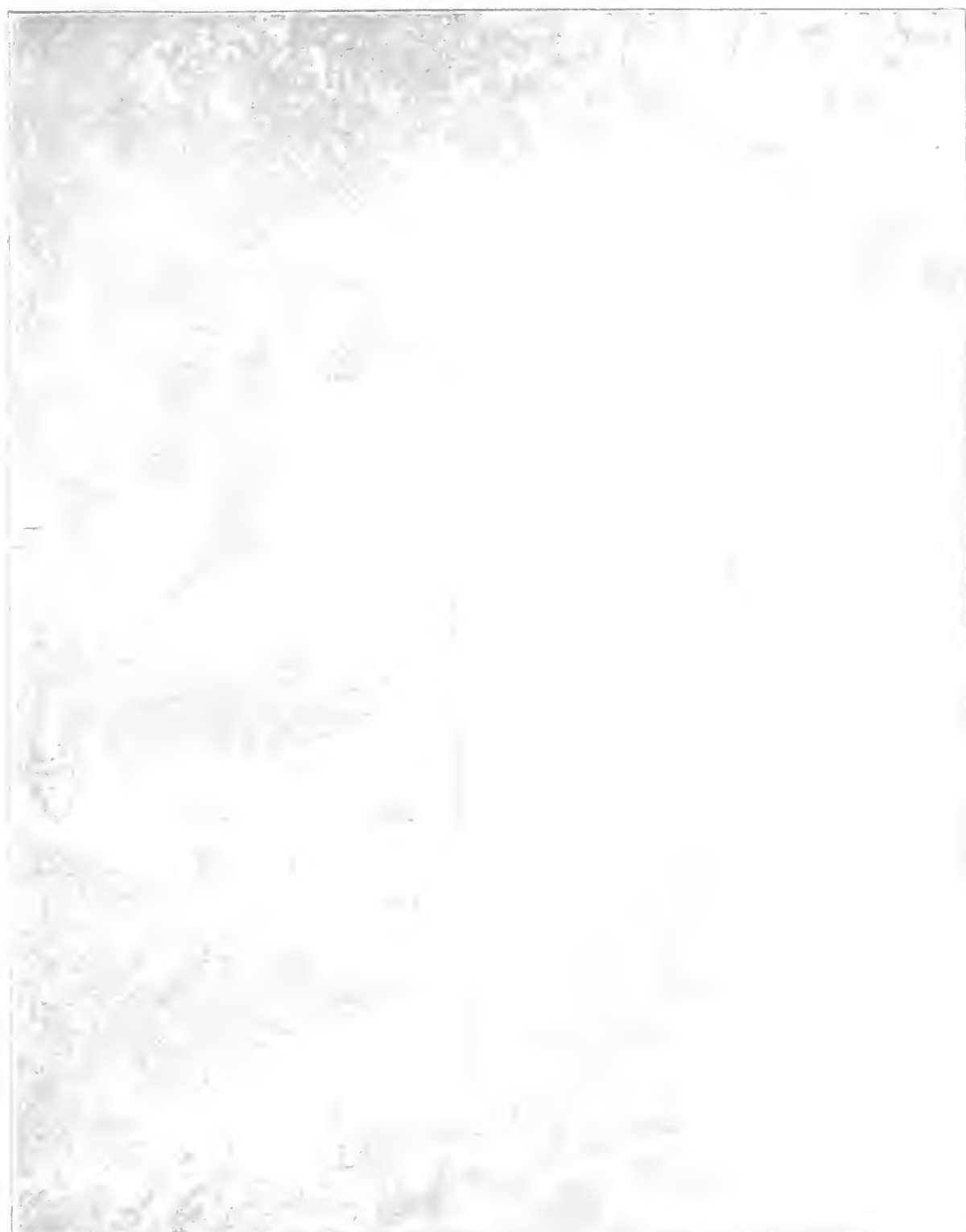
The Blue-Eyed Nell mine is located on the divide between Fergus and Meagher counties, and is a well defined vein, striking east and west, in a contact between lime and porphyry, and, considering the amount of development accomplished, shows exceedingly well. The lead has been developed with a tunnel run on the lead, and sinking below the tunnel level is in progress. The mine is owned by Messrs. Hughes and Salter, the former being the manager.

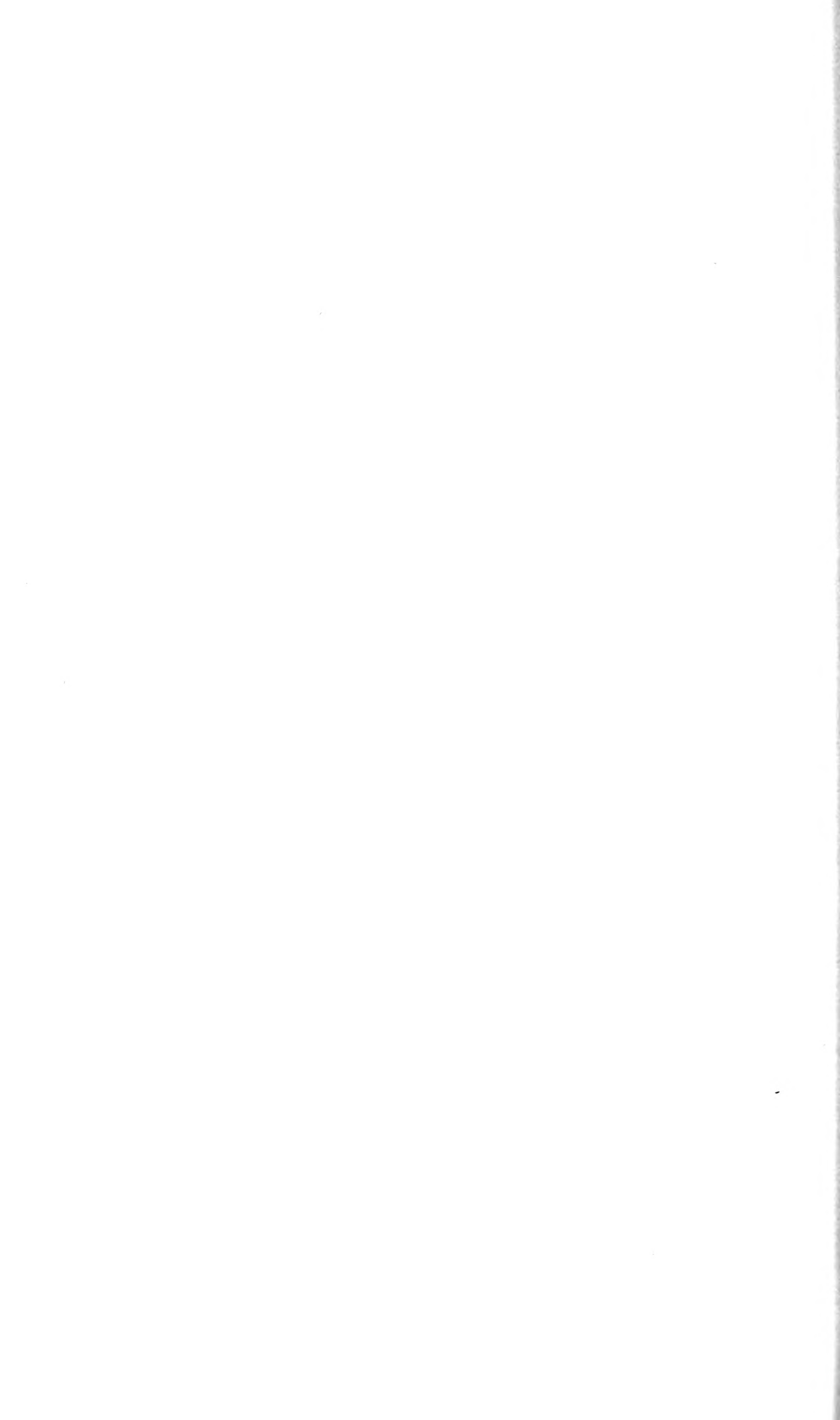
THE TREEDERS MINE.

This claim is situated sixteen miles from White Sulphur Springs and is owned by Mr. Barney Tierney. The claim is developed by a short tunnel and a winze sunk from the tunnel level, which brought in some rich gold ore, assaying as high as \$175 to the ton. Mr. Tierney also owns the Checker Board claim, located in the same district, and which he has developed with a 200-foot tunnel. The vein is a well defined fissure carrying a gold-silver ore.

THE RED CANNON CLAIM.

The Red Cannon is located sixteen miles northwest of White Sulphur Springs and is operated by Mr. J. A. Toston, who is doing considerable development work. The vein is a fissure carrying gold values.





Powell County.

Powell county presents another mineral area that offers the best of opportunities for the investment of capital in the development of her many fine quartz leads, but as the county has been out of the regular beat of the promoter, and perhaps her prospect owners have been a little too exacting in the conditions they were willing to grant for development, etc., little or no outside capital has been attracted her way, and practically the only mining that has been done within her borders has been the surface development and ore extraction made by poor men. The mountain areas of the county are rugged and precipitous, affording, in almost all instances, an opportunity to develop properties to great depth, with tunnels. During the history of the county its placer mines have produced over eight million dollars, and its quartz leads one and a half million dollars. The county has good railway facilities, an abundance of water that is well distributed, and mining and fuel timber that will last for many years to come, and in passing over the several mineral districts of the county one cannot help being impressed with the fact that there are presented some of the best mining opportunities to be found in this state or any other. During the past year there has been a good showing of copper made in some of the leads that has created considerable local interest, and the Ovando and Helmville districts have received some attention.

The following is the production of metals for 1904:

Gold, fine ounces, 7,054.523—\$145,829.94.

Silver, fine ounces, 11,960.34—\$15,471.63.

Copper, fine pounds, 30,000.

Lead, fine pounds, 7,200 (uniting Powell, Park and Ravalli counties).

The following is the production of metals for 1905:

Gold, fine ounces, 2,965.504—\$61,302.41.

Silver, fine ounces, 19,807.09—\$25,609.07.

Lead, fine pounds, 141,200.

THE NEW YORK-MONTANA GOLD MINING GROUP.

This group consists of four claims that are situated in the Coloma mining district, and is owned and operated by the New

York-Montana Gold Mining company, Mr. L. C. Parker being the general manager and Mr. T. A. Day the superintendent. The principal development is on the Mammoth claim, where there is a shaft 270 feet in depth and from the levels of which over 2,000 feet of development drifting has been done, some 500 feet of the work being accomplished during the present year. The workings are timbered with sets and stulls, and the stopes are filled. The shaft is equipped with a Ledgerwood hoist, engine and boiler, seven-eighths round steel cable, cages with safety appliances, and an air compressor. A 10-stamp mill with Blake crusher and Wilfley tables, is located about one mile from the mine at the forks of Washoe and Union creeks. The country formation is granite, lime and shale. The developed lead of the Mammoth has a northerly strike and is a contact between granite and lime, the ore produced being a sulphide carrying gold as the principal value. The property has two fissure veins with a westerly and easterly strike. The mine is in good condition, and is employing twenty men.

THE BIG DICK MINE.

The Big Dick mine is located ten miles south of Elliston on what is known as Nigger Hill, and is developed with a 300-foot shaft with considerable drifting from the several levels. Fifty feet of the shaft and 575 feet of drifting was constructed during the present year. The mine is equipped with a steam hoist and pumping plant. The vein has an east and west strike and lies in a contact between porphyry and andesite, the ore being a sulphide running in smelter returns from \$60 to \$300 per ton. The system of stoping is to break and fill. Regular shipments are being made to the East Helena smelters. The property is owned and operated by the Evening Star Mining company, Mr. John Handly being general manager and Mr. Peter Vye superintendent. Seven men are employed.

KEINO MINING GROUP.

The Keino Mining company is developing the Keino group of claims, located on the west side of Nigger hill, on the Little Blackfoot river, having constructed a tunnel that has penetrated

the vein a distance of 600 feet, 400 feet of which work was accomplished during the present year, and a raise to the surface, to provide an exit and ventilation, has been commenced. When the property has been sufficiently demonstrated, proper equipment will be installed and deep sinking and lower exploration work will be undertaken. The formation is porphyry, requiring close timbering. Ten men are being employed.

THE EMERY MINE.

The Emery mine is located nine miles northwest of Deer Lodge and is owned by the Emery Mining company, Mr. W. I. Higgins being the general manager and Mr. C. N. Lowring the superintendent, the company at present employing fifteen men. The property is operated through an incline shaft 700 feet in depth and equipped with a steam hoist and skip. There is considerable development from the shaft levels. The 50-ton mill is in constant operation treating the second-class ore of the dumps. The mine has not been in operation for the past two years, but is now being retimbered where found necessary and the stopes are being placed in shape for the extraction of ore.

THE COMET MINE.

The Comet group of mining claims is located sixteen miles northwest of Bearmouth and five miles west of Garnet, in a projecting southwesterly corner of the county, and in the Coloma mining district. The group is owned by the Comet Gold Mining company, and development and operation is in charge of Mr. H. V. Salisberg. About 2,800 feet of development work has been done, consisting of shafts, tunnels, drifts and upraises, 200 feet of upraising and 400 feet of drifting having been accomplished during the present year. There is also a 550 foot shaft that is down on an incline of 40 degrees, and 150 feet of this sinking was done this year. The property is equipped with a steam hoist and pumping plant and a 10-stamp Huntington mill. The formation is granite and lime, and the country is cut by a great porphyry dyke. The vein, which is considerably faulted, is from four to six feet in width and the ores run high in gold and copper values.

The mine has an excellent showing and development for the opening of additional bodies of ore is in rapid progress. The mine is well timbered, but at the time of inspection was not well ventilated. This defect, however, has been corrected. The company employs eighteen men.

THE COPPER CLIFF MINES.

This property is located twelve miles northeast of Bonita, a small station on the Northern Pacific railway, and on what is locally known as Cliff mountain. A shaft located on the Copper Cliff claim, has been sunk 400 feet, half of which sinking being done during the present year. The shaft is timbered with 10x10 timbers and is equipped with an 8x10 Ledgerwood steam hoist, a five-eighths round steel cable and a cage with proper safety appliances attached. Considerable exploration has been done from the lower shaft levels, 250 feet of which has been accomplished during the present year. During the present year a 500-foot crosscut has been run, tapping the vein at a depth of 250 feet and connecting with the shaft workings, in which there are large bodies of ore exposed. In timbering, tunnel sets are used in the main drifts and square sets in the stoping portions. The ore is a sulphide carrying copper and silver, the former being the principal value. A tunnel has been driven 70 feet on the Crescent claim, securing the vein, and at this point a winze was sunk 50 feet and stoping is being carried on from drifts run on that level. All shipments are made to smelters at Tacoma. The formation is gneiss, porphyry and lime, the developed vein being a contact between gneiss and lime. The gangue is porphyritic. The mine was in fair condition when inspected. The company operating the property contemplates extensive development and large future operations. Thirty-four men are employed. The group is owned and operated by the Copper Cliff Mining company, Mr. R. S. Illingworth, manager, and Mr. Charles Vincent, foreman.

Park County.

The mining of precious metals in Park county during the past year has made quite satisfactory progress. The chief mineral district of the county is at Jardine, formerly called Bear Gulch, where the Kimberly Gold Mining company has its operating property and plant, and there are also many prospects in the vicinity that are especially promising. It is unquestionably a fact that there is a large mineral area in this county in which there are great bodies of gold ore that only await the investment of money in development and mills, to produce fortunes in return for comparatively small investments. This area is over 20 miles square and will compare favorably with any gold district in the range. A characteristic of the district is that values constantly increase with depth. The field is not even prospected, there being as good claims to be discovered as those now located.

The following is the production of metals for 1905:

Gold, fine ounces, 3,487.814—\$71,065.93.

Silver, fine ounces, 1,268.74—\$1,640.39.

THE KIMBERLY GOLD MINES.

This group consists of nineteen claims located at Jardine. The property has been thoroughly developed by tunnels running in length from 250 to 900 feet, the aggregate lineal feet of the workings being over 16,000, and the exploration is steadily pushed ahead placing immense reserves of ore ahead of the extraction. Two thousand feet of drifting and upraising have been constructed during the present year. The veins in the upper workings lie flat and the ore occurs in large chambers. The country formation is schist and shale and the strike of the veins is east and west. The ore value is in gold. The output of the mine is treated in a 40-stamp mill and cyanide plant, and this capacity is to be increased one-third, the mine now being in shape to produce 700 tons of ore per day. The plant is operated by electricity. The company has done a great deal of surface exploring and in this work discovered shelite ore in such quantity that a mill is being erected for its treatment. There are 80 men employed in the mines and mills. The mine is well ventilated and

provided with proper protection. The property is owned and operated by the Kimberly Gold Mining company, Mr. H. H. Ryan being the superintendent and Mr. W. G. McQuillan the foreman.

THE CREVASSE AND HELENA CHIEF MINES.

These mines are located four miles east of Jardine and are owned by Mr. W. G. Conrad. There are three claims in the group and they are operated under the supervision of Mr. J. G. Fletcher, who is employing thirty men. The mine is developed with a 1,200 foot tunnel that exposes large bodies of ore. During the present year 800 feet of work has been accomplished and upraises made to the surface that afford exits and good ventilation. The veins are well defined fissures with a dip to the southeast at an angle of 45 degrees, and run in width from three to six feet. The ore is an iron oxide and carries gold as its chief value. The country formation is gneiss, shale and granite, with the latter as the hanging wall of the veins. A 20-stamp mill is located near the main workings and is treating from 600 to 700 tons of ore per month. It is intended to enlarge the mill to 40-stamps and equip it with the most improved value-saving machinery.

THE BUFFALO-MONTANA MINING COMPANY.

This is an old property, located at Cook, and is 65 miles east of Gardner, the entrance point to the National Yellowstone Park. The mine has been idle for years, but now the old workings are being retimbered and put in shape for the extraction of ore, and new development is in active progress, over 300 feet of exploration having been accomplished since the resumption of work the past summer. The company smelter, that has been idle for something like twenty years, has been repaired and put to work treating 50 tons of ore per day taken from the old dumps. The resurrection of this property and the starting of the smelter, which is to be remodeled and made thoroughly modern in the near future, marks a new era in the mining history of Cook. The company is employing 100 men. Mr. Charles Eaton is the superintendent and Mr. N. P. Frendennick is the foreman.

THE YOUNG BONANZA MINE.

The Young Bonanza mine is owned and operated by P. A. Bell & Bro. The vein is developed with a crosscut tunnel 300 feet in length, tapping the lead at a depth of 400 feet. From the point of intersection the lead has been developed with drifts. Two hundred feet of the work has been done during this year. The ore is a sulphide that carries gold silver and copper. The vein is a fissure with a northeast strike; the formation is riolite and porphyry. The ore values are increasing with depth. The property is five miles north of Cook.

THE KING AND QUEEN MINE.

The country formation of the King and Queen group, which consists of four claims, is granite and porphyry, the veins are well defined and run in width from six to twelve feet, the ore carrying gold and copper. The group is situated seven miles north of Cook and is owned by the Copper King Mining & Development company, which is doing extensive development work.

THE PILGRIM GROUP.

The Pilgrim group is located in the Jardine district, and is owned by Barney Hanlen and is under lease and bond to Geo. L. Brown of Helena. There is a tunnel on the Pilgrim claim 400 feet long which penetrates several large ore bodies through which an upraise has been made of 65 feet. The vein is fully 20 feet in width. The ore is characteristic of the district. There is a splendid mill site and an abundance of water.

IMMIGRANT GULCH.

The Nolan Brothers of Livingston have for some time been engaged in the development of a group of claims in Immigrant gulch and have now equipped the property with a modern 10-stamp concentrating plant. The ore carries gold values.

Ravalli County.

The Bitter Root range of mountains that occupy the north and eastern part of Ravalli county, has a well defined mineral zone that, during the past year has attracted considerable attention, and the results of the development work done has produced very satisfactory results. The zone proper is from one to two miles wide and the strike can be readily followed for several miles, the demarcation being a succession of veins or belts of mineralized gangue richly impregnated with sulphides carrying gold, silver, lead and copper. The leads are from 20 to 30 feet in width, and afford the most attractive possibilities for developing into large producing mines of the concentrating character. There are several undeveloped veins in the district that offer the best of inducement for development.

The following is the production of metals for 1905:

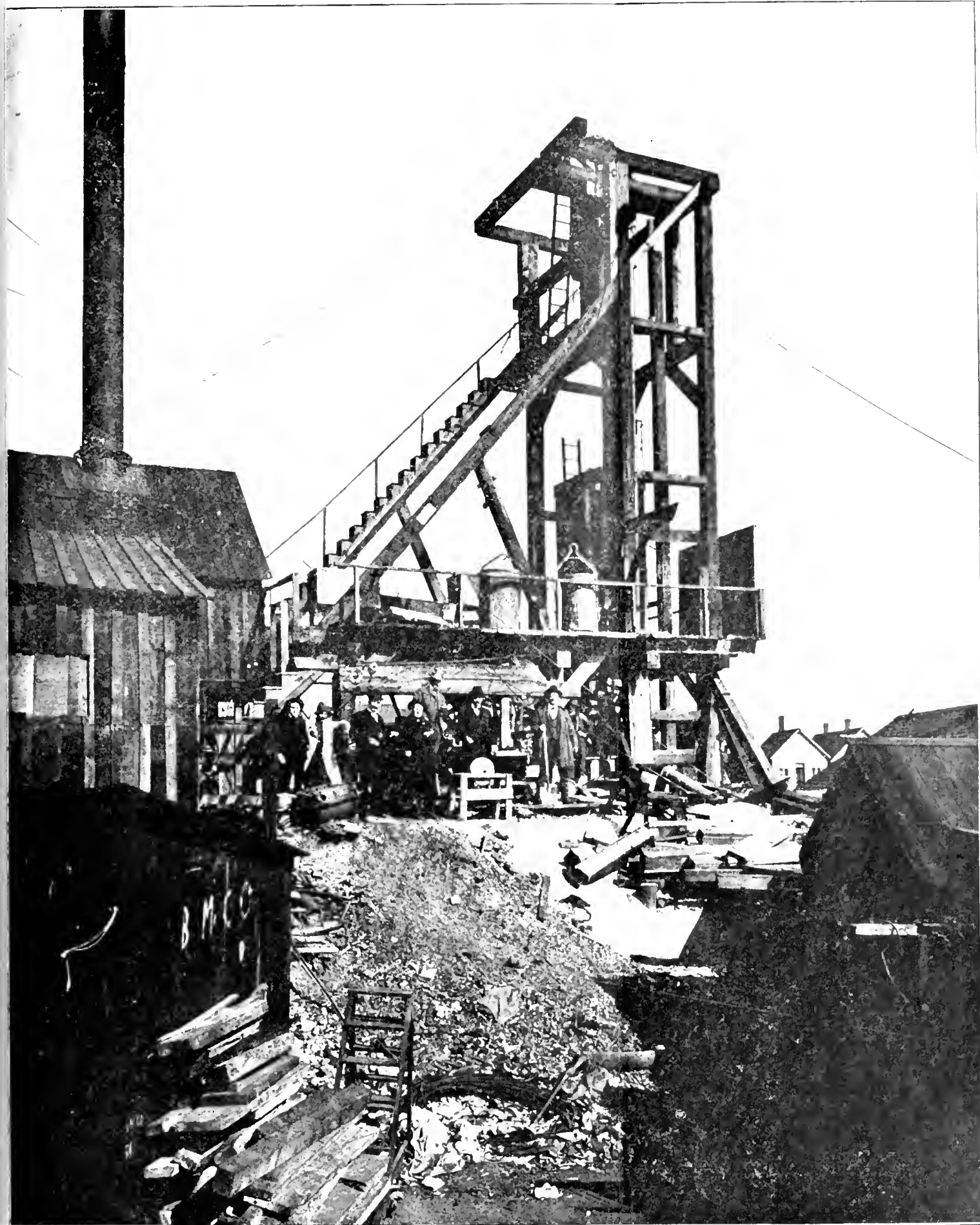
Gold, fine ounces, 403.218—\$8,335.26.

Silver, fine ounces, 67.08—\$86.63.

THE CERLEW MINE.

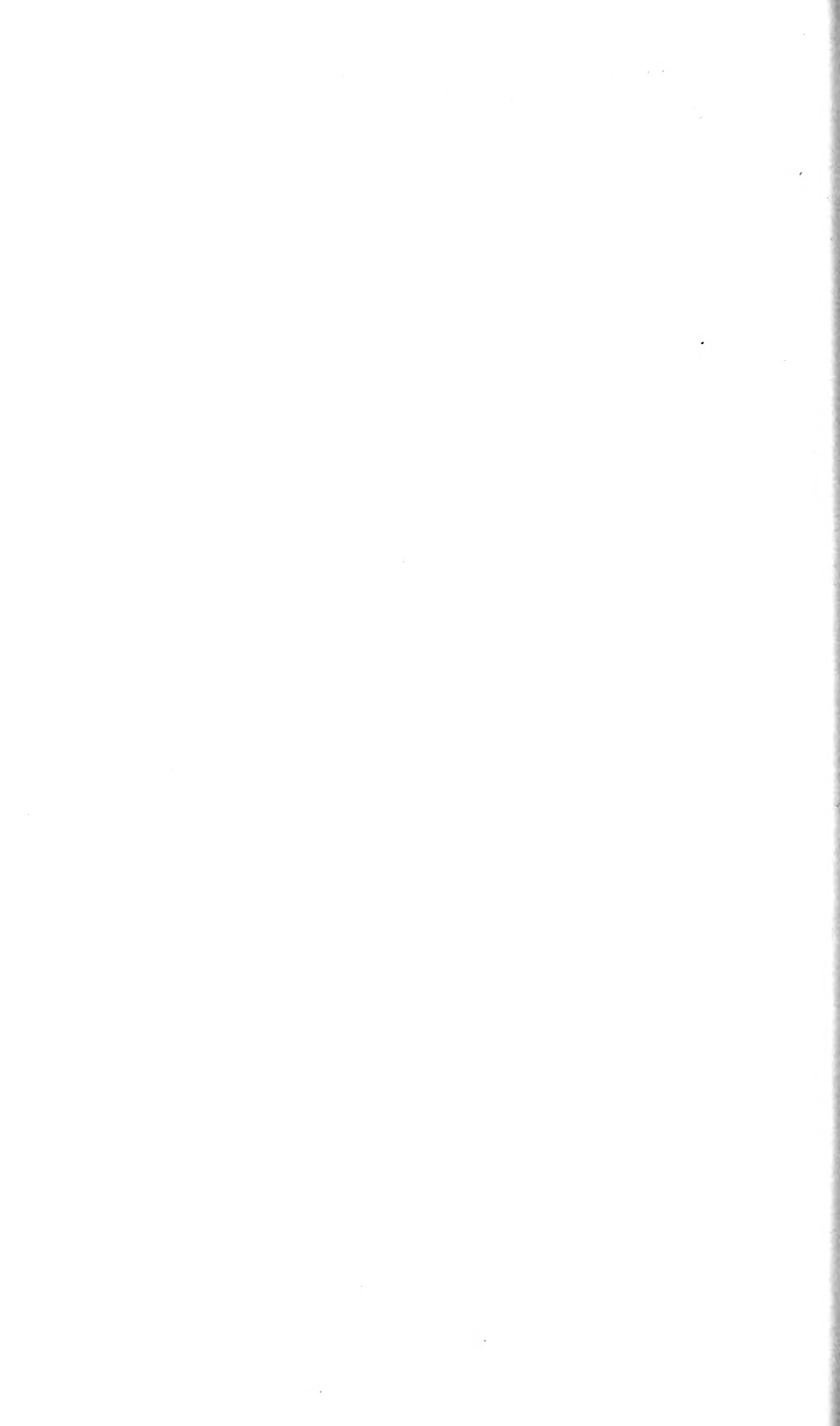
The Cerlew group consists of seven contiguous quartz claims, situated about four miles northwest of Victor, and are owned and operated by Mr. A. M. Holter, Mr. Thomas Cowan being the superintendent, and employing 20 men. The property is developed with a 100-foot perpendicular shaft, which is equipped with a steam hoist, and there is about 1,000 feet of drifting from the shaft and tunnel work, a large part of which was accomplished during the present year. There are two parallel veins that carry gold, silver and copper, and are true, persistent fissures that have every indication of permanency. The strike of the veins is east and west, the hanging wall being quartzite and the footwall granite. It is the intention to sink the shaft an additional 300 feet and do extensive drifting from the attained levels, and to connect these with the upper workings for ventilation and means of exit. The output of the mine is treated in a 100-ton concentrator that is conveniently located on the property.





EMMA MINE, SURFACE PLANT, BUTTE





THE ORE FINDER MINE.

The Ore Finder group is situated five miles southwest of Victor and is owned and operated by the Ore Finder Mining company, Mr. John Hickey being the general manager and superintendent. The mine has been developed to a depth of 200 feet by a perpendicular shaft of two compartments, and from which some 300 feet of drifting has been done, revealing ore bodies carrying gold, silver and copper values. The vein is well defined and is from 20 to 30 feet in width and promises to develop into a mine that will meet the expectations of its owners. The workings are equipped with a steam hoisting plant and bucket. The greater part of the development work has been accomplished during the present year.

Sweet Grass County

The mineral resources of Sweet Grass county are as yet almost wholly undeveloped, but there has been sufficient prospecting work done to demonstrate the fact that there are large and highly mineralized areas in the mountains in the northern and southern parts of the county. There are many of the most promising veins that carry gold, silver and lead values in the vicinity of the head waters of Big Timber and Sweet Grass creeks, some thirty miles from the town of Big Timber. Ore has been shipped from a number of the prospects of this district, demonstrating that the mines developed to this stage of productiveness could be made good paying mines and large producers, but for the haulage expense and the high rates of rail transportation. The most extensive mineral zones are, however, found in the southern part of the county. The Boulder river leaves the mountains about 30 miles south of Big Timber, and in this vicinity, locally known as the Contact District, there are many veins of gold bearing quartz, and these have secured considerable development, demonstrating that they warrant competent exploration. From Contact to Independence, a distance of thirty-five miles, the whole country, which is mountainous, is interlaced with highly mineralized veins, and these have had surface prospecting in numerous places, and while they give every promising evidence,

there has not as yet been any capital attracted to the vicinity that could undertake proper development. Near Hicks Park, which is about 20 miles south of Contact, there are a number of large copper veins that carry exceptionally high grade croppings and surface ores, the revelation of the prospecting and the surface being sufficient warrant for the patenting of a number of properties, but the lack of transportation facilities has prevented the extensive development of any of the claims of the district. The Independence mining district is at the head of Boulder river and has both placer and quartz leads that are rich in values and cover a large area, but the development has been retarded by the remoteness of the district from railway transportation. From the headwaters of the Boulder it is only a short distance to the well known mining camp of Cook City.

Surveys have demonstrated that the most feasible railway route to the Cook City district is up the Boulder from Big Timber, a water grade being afforded over nearly the entire distance, and its construction over the route is only a matter of time. With the construction of a railway through this territory there is little doubt but that the mineral area between Cook and Contact will be speedily developed into one of the richest mining districts of the state. There are also copper veins and marble dykes in the vicinity of the head waters of Deer creek.

Most of the claims that have been located and prospected to any extent are situated a long distance from railways and are among high and precipitous mountains, making extensive development expensive and working practically impossible until such time as steam or electric railways afford means of transportation in and out. When this facility is afforded, with the numerous high water falls of the Boulder river and the largest timber belt in the state, the southern half of Sweet Grass county will become one of the richest mining districts of the state.

Sanders County

Sanders, the youngest county of the state, having been created by the legislature of 1903, while having some exceptionally fertile valleys, is largely mountainous and has a great area that is highly mineralized. The mountains are precipitous and range from 7,000 to 8,000 feet altitude. The great mineral zone

stretches over the mountains to the Idaho line and the strong fissure veins that have a general easterly and westerly strike can be easily traced through many successive mountains. The ore of the district is of the higher grades and carries gold and silver and in places showing copper. The mineral possibilities of Sanders county are great and development will be made with practical assurance of success.

THE KING AND QUEEN MINING COMPANY.

The King and Queen Mining company is operating the King and Queen group of mining claims that are located nine miles northwest of Iron mountain, on a branch of the Northern Pacific railway. Mr. S. T. Wood is the superintendent and Mr. W. M. Carney, the foreman. Twenty men are employed on the property. The mine is developed with a tunnel 860 feet in length, intersecting the vein at considerable depth. At the point of intersection a winze has been put down 100 feet and is equipped with a Morris hoist that is operated with compressed air furnished by an Ingersoll compressor that is located a half mile below the mine. All of the work being done is in the line of exploration, and the placing of ore in sight with a view to the complete equipment and operation of the property. About 300 feet of work has been accomplished during the present year. The character of the ore is a sulphide carrying gold, silver and copper, the strike of the veins being east and west and showing a width of from 8 to 10 feet. The foot wall is quartzite and the hanging wall lime, and the vein filling is porphyry. There are several prospects in the neighborhood of Spring gulch that are being operated in a small way, and are showing well. The leads are well defined and high assays of gold and silver are obtained.

THE SHAMROCK MINE.

The Shamrock mine is operated through a series of tunnels the longest of which is over 1,000 feet, 350 feet of which has been constructed during the present year and is on the vein and has opened some large bodies of high grade ore carrying gold and silver. The development of the property is being carried on vigorously and systematically. The country formation is slate

and quartzite and the strike of the vein is east and west. The erection of a mill for the treatment of the mine ores is contemplated for the near future. The property is owned and being developed by the Shamrock Gold Mining & Milling company, of which Mr. Ben. Jacobs is the general manager and superintendent, and is employing 15 men.

THE STANDARD MINE.

The Standard group is located 11 miles southwest of Thompson Falls and is owned by the Standard Mining company. The group is traversed by several fissure veins that are well defined. The principal development of the veins is a 1,500-foot crosscut tunnel that intersects the vein at a depth of 900 feet, and drifting has been done from the point of intersection, opening some good bodies of high grade ore carrying silver and lead, and from which considerable shipment has been made. During the past couple of years, with the employment of 14 men, some 1,400 feet of development has been accomplished. The mine is equipped with a Lyner compressor, and water power.

REPORT OF THE DEPUTY STATE MINE INSPECTOR.

Butte, Montana, December 1, 1906.

Hon. William Walsh,
State Mine Inspector,
Helena, Montana.

Dear Sir:—I herewith submit for your approval, my report of mines examined and their condition, together with a list of the fatal and non-fatal accidents for the fiscal years ending November 30, 1905-6.

Respectfully yours.

W. B. OREM,
Deputy State Mine Inspector.

The present year has been the most prosperous ever experienced in this state by the copper industry, the price of copper having advanced during that period from 15 to 22 cents per pound, and there is every assurance that it will remain at this figure for at least a considerable time, as the increase of the production of copper has not at all kept pace with the increase of consumption. With these market conditions prevailing and the resumption of work in the many mines that had been closed down through the Heinze-Amalgamated litigation that was suspended with the absorption of the former's interests by the later, the recent past of the camp has been very active and the future activity of the mining interests promises still more vigorous activity. The high price of copper and the promise that the present value is to be maintained has encouraged development of many properties that in the past have not been regarded as particularly valuable, and some of these are giving evidence of great improvement and of becoming large producers.

During the past year there have been many and large improvements made through the district mines. At the Leonard and Pennsylvania mines skips have been installed for the handling of ores, allowing a material increase in the output of the mines. Hoisting with skips is now considered the most economical method, and its adoption by all the large producers is only a question of a short time. The skips have a capacity of from 6 to 8 tons and are attached either above or below the cage. Skip chutes, where the skips are automatically loaded, are cut at the different stations and are made of any desired

capacity. Men, horses and compressed air motors are employed in tramming the ore from the stopes to the skip chutes.

The ores from the Boston & Montana mines are shipped to the company smelters at Great Falls for treatment, and those of the North Butte, Red Metal, Lexington, Pittsburgh & Montana, all Amalgamated properties, are shipped for treatment to the Washoe smelters at Anaconda, the plant treating 10,000 tons of ore per day. The output of the W. A. Clark properties amounting to 1,250 tons per day, is treated at the Butte reduction works. The deeper developments that have been secured during the present year, some of the workings of the camp getting down to a depth of 2,600 feet, have been more than encouraging, showing that the ore bodies are still continuing down and retaining their size and increasing their values. The problem that is the most troublesome in management is that of proper and adequate ventilation and this necessity of mining is now receiving more careful attention by the management of many of the larger properties. It is my opinion, arrived at from a close observation of the mines of this district, that the most satisfactory and economical method of ventilation for the mines of Butte is by means of independent air shafts that are wholly separate from the hoisting shaft, run down from the surface and kept at the same depth as the lowest workings and connected with them, giving a powerful and natural current that is constant in the supply of fresh air and in the removal of the vitiated air of the mine workings. In some cases where connections have been made with other mines, the air secured through this source has been more of a detriment than a benefit, as it has been the more polluted of the two atmospheres. Such connections with the workings of other mines are, however, an appreciated protection to the miners, as they afford additional avenues of escape in case of accidents. I believe that every mine should have its own independent air shaft and that it should be constructed in the ground outside the vein and entirely independent of the mine workings, being connected with crosscuts.

The satisfactory results secured in pumping with electric power leads to the hope that, in behalf of better ventilation, this power for pumping will soon be adopted by all the mining companies.

The ventilation of the Amalgamated properties has been greatly improved by the construction of a system of drainage tun-

nels that conduct the mine waters to central pumping stations, avoiding the necessity of pumping stations in many of the mines, and thus reducing the temperature of the mines so relieved.

The mining companies now generally appreciate the fact that good ventilation of the workings of mines pays the operating company in dollars and cents; that the money invested in improving the air of the mine is returned many times by the increased productive ability of every man working below ground.

Since the new shaft at the Leonard has reached the 1,200-foot level, the temperature of the workings has been reduced 20 degrees F. The Pennsylvania has raised a shaft from the 1,200-foot level to the surface, and are now raising from the 1,600-foot level, and the temperature has been greatly reduced. The Mountain View has sunk and raised a shaft from the surface to the 1,100-foot level. At the Never Sweat mine an upraise has been made from the 1,800 foot level to the Moon Light shaft, giving the latter additional depth and making great improvement in the ventilation. The Rarus has had an air shaft sunk from the surface to the 1,000-foot level and a raise is being made from the 1,600-foot level, and connections have also been made with the workings of the Minnie Healey, West Colusa, Mountain View and Pennsylvania. The ventilation of the Minnie Healey will be greatly improved by the new tramway shaft which is now down 600 feet and will be put down to the 1,100-foot level, where connections with the former will be made. The Cora is making connections with the workings of the Diamond at the 2,000 foot level, which will afford both drainage and ventilation. The Mountain Con has been connected at the 2,100-foot level with the Green Mountain for ventilation and the No. 6 shaft of the Comet has been connected at the 1,200-foot level with the Parrôt mine. The Anaconda is sinking a shaft to the 900-foot level in the St. Lawrence fire district. The Original mine is retimbering the old incline shaft to the 1,100-foot level and is raising from the 1,700-foot level to that point, and is also making connections from the lowest levels with the West Stewart.

Silver Bow County

The county of Silver Bow is the smallest in area in the state, and its mineral districts are confined to the vicinity of Butte and embraces an area of about seven by five miles, and so far as this Butte district is concerned, its mines and immense copper product are so great, and are so world wide in their deserved fame, that little need be said in addition to what is known of them. The district is the greatest copper producer in the world; Butte the greatest copper camp on earth—and that tells the story.

The following is the production of metals for 1904:

Gold, fine ounces, 63,617.922—\$1,315,099.16.

Silver, fine ounces, 10,484,654.19—\$13,555,916.53.

Copper, fine pounds, 283,070,422.

The following is the production of metals for 1905:

Gold, fine ounces, 58,016.929—\$1,199,316.36.

Silver, fine ounces, 11,361,602.00—\$14,689,748.04.

Copper, fine pounds, 308,489,520.

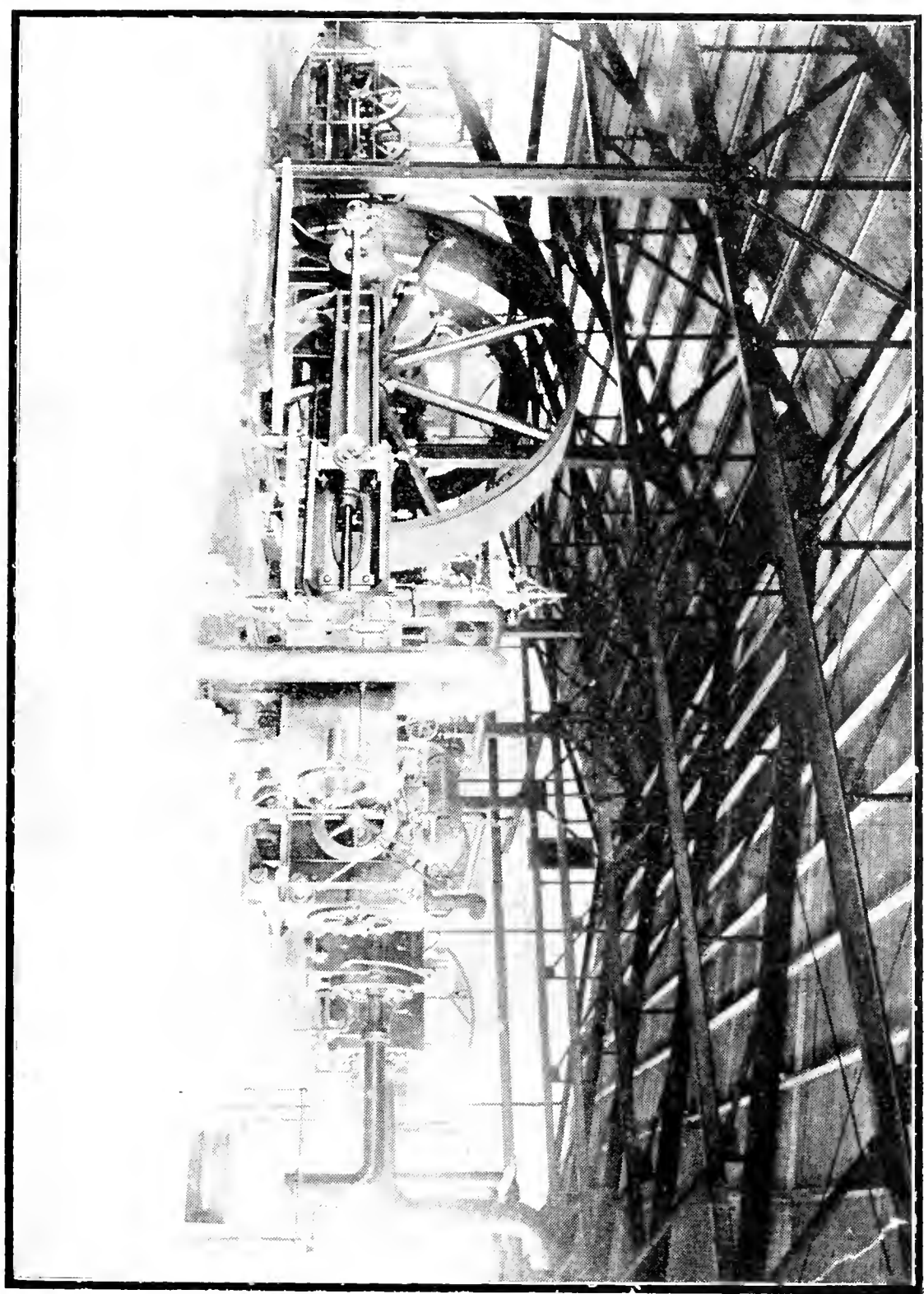
THE ANACONDA COPPER MINING COMPANY.

The mines operated by the Anaconda Copper Mining company during 1906, were the Anaconda, Never Sweat, St. Lawrence, Bell, Diamond, High Ore, Mountain Con, Gallatin, Belmont and the J. I. C. Mr. John D. Ryan is the general manager, Mr. John Gillie the general superintendent. The company employs 2,793 miners and 411 surface men.

THE ANACONDA MINE.

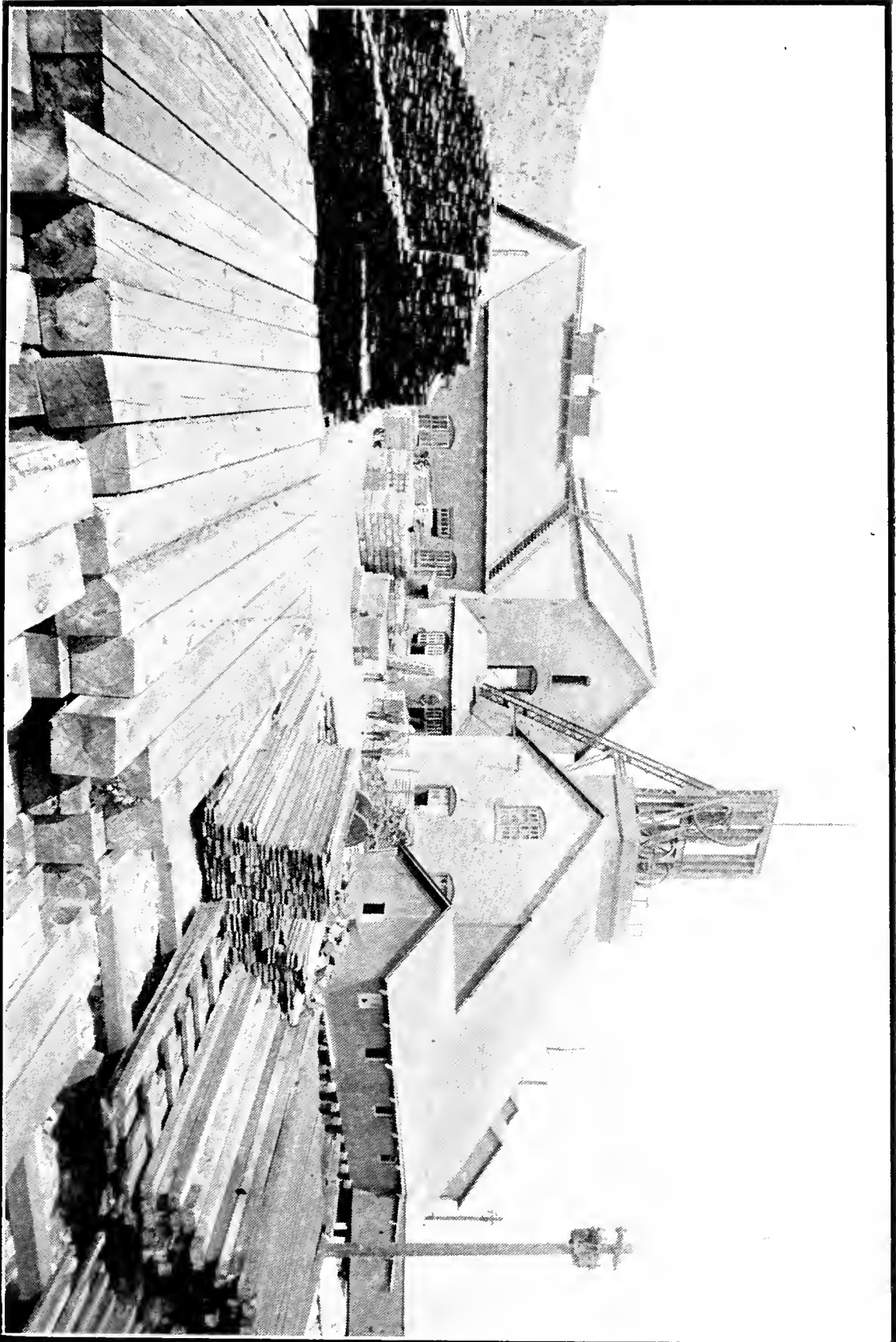
There are 590 miners and 140 surface men employed in the Anaconda mines, and also three surface and three underground engineers. Mr. J. P. O'Neill is the superintendent. The 3-compartment shaft is now down to a depth of 2,450 feet, there is electric bell communication with all parts of the workings and all sills and drifts are lighted with electricity. The mine is timbered with round and square timbers, framed with square sets. Timber is used in the construction of chutes and manways

COMPRESSOR VIEW AT NEVER-SWEAT MINE, BUTTE





STEEL GALLOWS FRAME AND STACK AT PARROT MINE, BUTTE



WEST COLUSA MINE, BUTTE

and stulls are used in unstable ground, and the system of back-filling is employed. The chutes are made of round and generally notched round timbers and are known as "log cabin" chutes. This system is safe enough, or is so considered, where the walls are hard and the ground generally good. It is necessary, however, to keep this kind of mining filled closely, have the stopes well picked down and the backs not too high. Ore can be cheaply extracted and handled under this system, as with no timbers and plenty of room, the chutes can be placed close together, giving the shovelers unobstructed room to work in and consequently increasing the ore supply to the chutes. There has been but one man hurt under this system of mining, and none killed, during the year.

The mine is large and requires three foremen, Mr. John Sullivan and Mr. Dennis Kennedy being the foremen on the main ledge, and Mr. John Andrews on the south ledge. The mine is equipped with double-deck cages, with 10-ton skips attached, 32"x72" cylinder, copper valve, Corliss engines, built by the Montana Iron Works, and 1½"x7" flat cable. The skips are loaded from different levels and hoisted to the surface and dumped automatically into the ore bins. Most of the ore is hauled from the stopes by horses, compressed air engines and men. The horses worked in the mine are seldom brought to the surface and they remain in fine condition.

The mine is well ventilated, having air connections with the Never Sweat, and the St. Lawrence south shaft that is 1,050 feet deep, with No. 9 that is 900 feet deep, with the Rose shaft in the south ledge and with three or four intermediate shafts. The St. Lawrence and Anaconda are engaged in sinking the Molly Murphy shaft to the 900-foot level. The mine has a dry for the accommodation of 600 men, having 32 shower baths. This is one of the essentials for the men, as it allows them to go home clean and dry, and as it maintains or improves their physical condition, contributes to the benefit of the employer.

THE NEVER SWEAT MINE.

The Never Sweat mine is operated under the superintendency of Mr. J. P. O'Neill, having 390 underground, 60 top men, three underground and three surface engineers, under him. The

main shaft of the mine is now down to a depth of 2,550 feet, having been put down 110 feet during the present year. The shaft has three compartments, is fitted with electric bells and all the levels and drifts are lighted with electricity. The equipment is a 32"x72" cylinder Union Iron Works engine, 1/2"x7" flat cable and two double-deck cages with 8-ton skips attached. The ore product is handled practically in the same manner as in the Anaconda mine. The motive power, lighting, etc., is secured from the transmission wires of the Missouri River Power company, whose generating plant is located on the Missouri river near the city of Helena. The mining is done with a compressor plant furnishing power for 360 drills run by five Ingersoll-Sergeant compressors. The workings have an abundance of air that is conveyed to the 2,400 through raises. There are connections with the Moonlight, Colusa-Parrot and the Parrot, and a connection has recently been made with the Moonlight shaft from the 1,800-foot level. The mine is timbered with round and square timbers framed in square sets and the system of backfilling is employed. During the year 400 feet has been re-timbered, putting in jacket sets or false sets, so that when the shaft moves, it can be jacked back. The plant of this mine also furnishes the Never Sweat, Anaconda, St. Lawrence, Moonlight, Mountain View, High Ore and West Colusa, with air.

THE ST. LAWRENCE MINE.

Mr. J. P. O'Neill is also superintendent of this mine, and Mr. Dan Crowley is the foreman. There are 390 miners employed and 50 top men, three engineers on the surface and three underground. The ventilation of the mine is excellent, having connections with the Mountain View, Pennsylvania, Anaconda, Never Sweat and also the Never Sweat and Metcalf raise from the surface and the end-line shaft from the surface. The mine is well timbered and is in good condition and is provided with a dry of abundant capacity and accommodation for the men employed. The working shaft is down 2,100 feet, 80 feet of which was sunk during the present year, and is three-compartment. The workings are equipped with a system of electric bells and the sills and drifts are lighted with electricity. The engine is a

32"x72" cylinder made by the Montana Iron Works, the cable is $\frac{1}{2}$ "x7" flat, and there are two double-deck cages with 8-ton skips attached. The timbering is square sets, square and round timber, and the backfilling system is used.

THE BELL MINE.

The Bell mine employs 100 miners underground and 10 top men. The main shaft is 1,600 feet deep, three compartments, and is equipped with two double-deck cages and a $\frac{1}{2}$ "x6" flat cable, the power being provided by a 28"x40" cylinder Chicago Iron Works engine. The ore is trammed with mules. The mine is timbered with round and square timber. Mr. James Higgins is the superintendent and Mr. W. J. Flood the foreman.

THE DIAMOND MINE.

The Diamond mine is equipped with a 32"x72" cylinder Riden engine, $\frac{1}{2}$ "x7" cable, two double-deck cages with 8-ton skips and an Ingersoll-Sergeant compressor that drives 47 drills in both this and the Bell mine. The main shaft has attained a depth of 2,200 feet, is three-compartment, and the timbering is done with square sets in round and square timber, the stopes being backfilled. Ventilation is fairly good, the workings being connected for air with the Wild Bill No. 4 shaft, East Gray Rock, Green Mountain, Mountain Con and also making connection with the 2,000-foot level of the Diamond and the 2,200 level of the Cora. Mr. James Higgins is the superintendent of the mine and Mr. James Higgins, Jr., is the foreman. The 3-compartment shaft is down 2,200 feet and is equipped with 4-deck cages, $\frac{1}{2}$ "x8" flat cable and 26"x72" cylinder Union Iron Works engine, and a system of electric call bells. The mine is timbered with round and square timbers, and 400 feet of re-timbering was done during the present year. The air in the upper levels is good, but in the lower levels is warm. Connections have been made with the Clear Grit, the 2,100-foot level of the Mountain Con and the 2,200-foot level of the Green Mountain mine, and these have greatly improved the air of the lower levels. The ore in this mine is trammed with horses.

THE MOUNTAIN CON MINE.

This mine employs 350 miners, 51 top men and three engineers. Mr. James Brennan is the foreman. The 3-compartment shaft is down 2200 feet and is equipped with 4-deck cages, $\frac{1}{2}$ "x8" flat cable and 26"x72" cylinder Union Iron Works engine, and a system of electric call bells. The mine is timbered with round and square timbers, and 400 feet of retimbering was done during the present year. The air in the upper levels is good, but in the lower levels is warm. Connections have been made with the Clear Grit, the 2100-foot level of the Mountain Con and the 2200-foot level of the Green Mountain mine, and these have greatly improved the air of the lower levels. The ore in this mine is trammed with horses.

THE HIGH ORE MINE.

The High Ore mine has a 3-compartment shaft down 2,600 feet, and is given credit with being the finest shaft in the Butte district. The equipment is $\frac{1}{2}$ "x7" flat cable, two 3-deck cages and a Montana Iron Works, 32"x72" cylinder, engine. There is a thorough system of electric call bells. The ore is trammed with horses. The mine is timbered with square and round timbers, the backfill system is used, and the ventilation is good, the mine being in fine condition. There is an extensive pumping plant attached to this mine, and aside from handling its own water, handles that of the Anaconda, Washoe and Parrot mines. The plant consists of three Dixon pumps with a capacity of 1,500 gallons per minute located at the 2,200-foot level, which hoist the water to the 1,600-foot level, where there are a similar set of pumps that raise the water to the 900-foot level, where another set of pumps of the same capacity raise the water to the 350-foot level, where there is an outlet that conducts the water to Meaderville, where it is used for precipitating. The foreman of the mine is Mr. Charles Ferns, and 424 miners are employed under ground, 55 top men and three engineers. Four hundred feet of the shaft was constructed during this year.

THE GALLATIN MINE.

The Gallatin shaft is down 250 feet and is equipped with a 5"x12" cylinder Griffith & Wedge engine, and single-deck cage, the timbering being done with round timbers. Mr. Mike Riney is the foreman, and employs 80 miners and seven top men.

THE BELMONT MINE.

Mr. Mike Riney is also foreman of the Belmont. The two-compartment shaft of the mine is down 900 feet, and it is the intention of the company to make this a permanent hoisting shaft for the south veins of the Anaconda mine and also for an airway. The shaft is at present equipped with a 12x14 geared hoist, 1 $\frac{1}{8}$ round cable and two single-deck cages. The mine is timbered with 10x10 round timbers.

THE J. I. C. MINE.

Mr. Mike Riney is the foreman of the J. I. C., also, and employs 88 miners, 12 surface men and engineers. The main shaft has three compartments and is equipped with a Ledgerwood engine, $\frac{7}{8}$ -inch cable, etc. The timbering is done with round and square timbers and is connected with the Idonia, Ground Squirrel and Gallatin, for air.

THE BOSTON & MONTANA CONSOLIDATED COPPER & SILVER MINING COMPANY.

The mines owned and operated during 1906, by the Boston & Montana company were the Green Leaf, Badger State, Leonard, Pennsylvania Mountain View, West Colusa and the East Colusa, and in the operation of these mines employes 1,611 men underground and 494 surface men. Mr. C. W. Goodale is the general manager and Mr. J. C. Adams is the general superintendent.

THE LEONARD MINE.

The main shaft of the Leonard is three-compartment and is down 1,200 feet. The mine is timbered with 12x12 and 14x14 square timber sets, the ledge being very large and requiring strong timbers and close filling and it is necessary to bring solid bulkheads up into the stopes in order to give something to block the timbers to. The stopes are worked in sections. A new four-compartment shaft has just been completed, the construction being both by raising and sinking, 700 feet of this work having been accomplished during the present year. This shaft is going to be of great benefit to the ventilation of the mine, and as its elevation is lower, will be a down cast. A million feet of timber is used each month in the mine, and where there is so much timber used and waste, it takes the distribution of a large volume of air to provide the workings with competent ventilation. One of the benefits of the new shaft is the morticing of a solid post between the center and end piece, it can be put in at any place, and it is my opinion that this is a decided advantage. There are skip chutes at the different levels in the mines that hold from 175 to 200 mine carloads. The chute mouth is in the shaft and the ore is loaded into the skips by the station tender and is hoisted and dumped automatically into the ore bins on the surface. The equipment consists of 1½"x6" flat cable, 20"x60" cylinder E. P. Ellis engine, three double-deck cages and a complete system of electric bell calls. Two air compressors furnish the power for 47 drills, and a Nordberg pump with a capacity of 1,000 gallons per minute, located on the 1,200-foot level, pumping to the surface, handles the water for this mine as well as for the B. & M. Mr. Wallace Corbett is the foreman.

THE WEST COLUSA MINE.

The West Colusa employs 375 miners and 50 surface men, Mr. A. J. Daum being the foreman. The depth of the main shaft is 1,700 feet 100 feet of which was constructed during 1906. The shaft is three-compartment and is equipped with two single-deck cages, 30"x60" cylinder Nordberg engine and 1⅛"x6" flat cable. The electric call bell system is used. The shaft is large, and in hoisting, one car is placed behind the other on the

cage. The ore is trammed with horses. The mine is timbered with 10x10 round timbers framed into square sets. The ventilation is secured by connection with the Comanche shaft, the Alex Scott, Leonard, Minnie Healey, and with two raises to the surface, and is good, the workings being abundantly supplied with fresh air.

THE PENNSYLVANIA MINE.

The main shaft of the Pennsylvania shaft is 1,800 feet deep and is three-compartment, equipped with electric bell service. The hoisting power is provided by a 19"x18" cylinder Ellis engine, with a 1½"x5" cable and there are two double-deck cages. The company is now installing a new 32"x72" cylinder Allis Chalmers engine, 1½-inch round rope, steel gallows frame 120 feet in height, two double-deck cages with 8-ton skips attached, and a new boiler plant. The foreman of the mine is Mr. James McQuay. Four hundred and thirty miners are employed and 65 top men.

THE MOUNTAIN VIEW MINE.

Mr. Dave Henry is foreman of the Mountain View mine, employing 438 miners and 79 top men. The three-compartment shaft is down 1,800 feet and is fitted with a system of electric call bells. A Webster, Camp & Lane, 28"x72" cylinder, engine, ½"x7" flat cable with a capacity of 3,500 feet, two double-deck cages with 6-ton skips, have been installed. The mine is timbered with round and square timbers framed into square sets. The ventilation is fair, the workings having connections with the West Colusa, Pennsylvania and St. Lawrence. The stopes are filled. The mine has had skip chutes cut into the various levels and the ore is hoisted and automatically dumped.

THE GREEN LEAF MINE.

The two-compartment shaft of this mine is down 500 feet, being constructed during the present year. The equipment consists of 10"x14" engine and a single-deck cage. Mr. Ed Showen is the foreman, and employs 12 miners and seven surface men.

THE BUTTE & BOSTON CONSOLIDATED MINING CO.

The mines operated by the Butte & Boston company during the present year, are the Gray Rock, Silver Bow No. 1, Berkley, and Kane shaft. Mr. B. H. Dunshee is the superintendent. The company employs 472 miners and 93 top men.

THE SILVER BOW NO. 1 MINE.

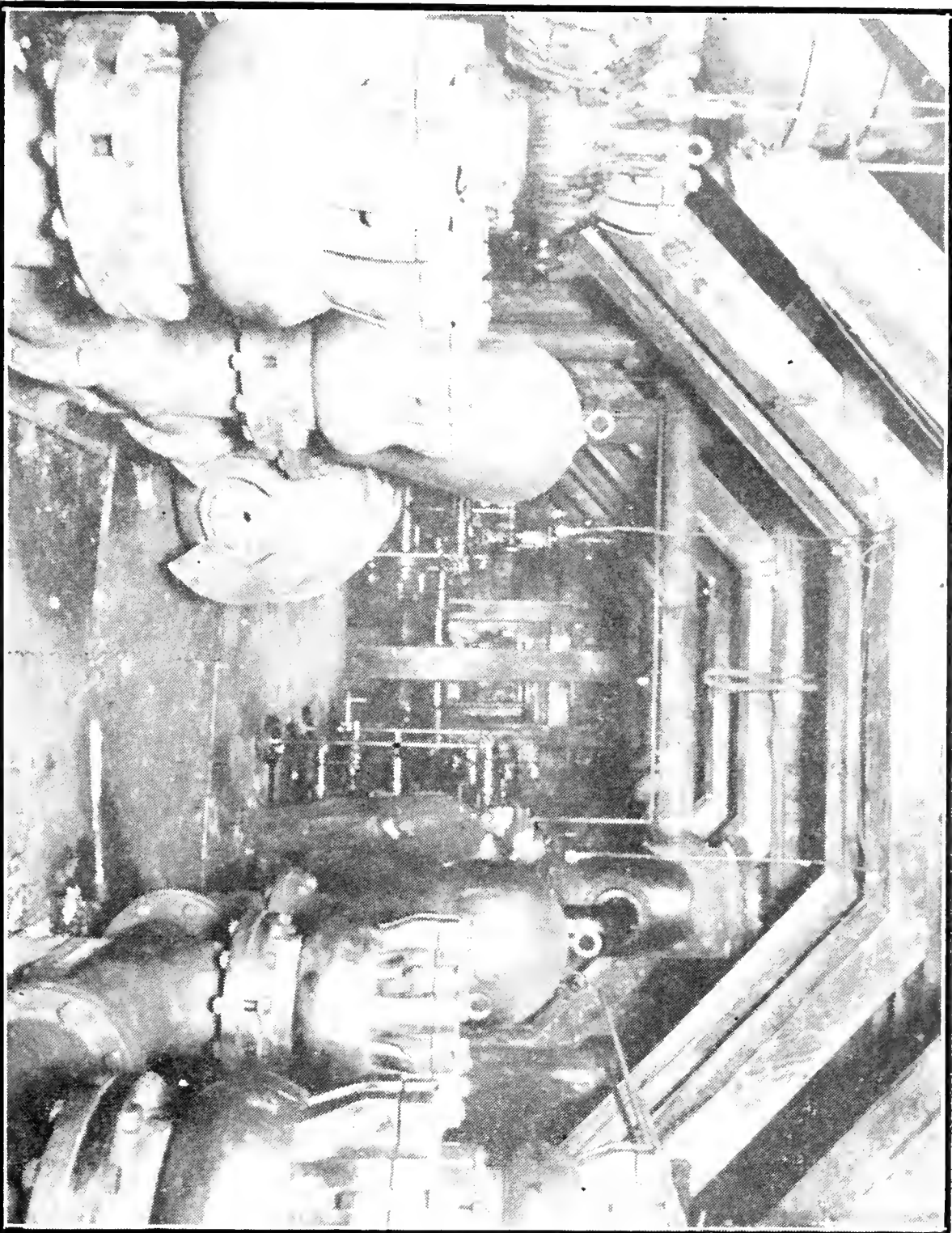
The mine has a 3-compartment main shaft that is down to a depth of 1,000 feet, and is equipped with a $\frac{3}{8}$ "x4" flat rope, a 16x42 cylinder Ellis engine, two single deck cages, electric bells, and an 800-gallon per minute Reidler pump installed at the 1,000-foot level that hoists water to the surface. The mine is timbered with 8x8 square timbers and round timbers, the mine generally being well timbered and filled. The air connections are made with the Silver Bow No. 3, Pennsylvania and Berkley and also the Kane shaft, and the ventilation is good. The ore is trammed with horses and men. Mr. W. E. Kane is the foreman, employing 138 miners, 48 surface men and three engineers.

THE GRAY ROCK MINE.

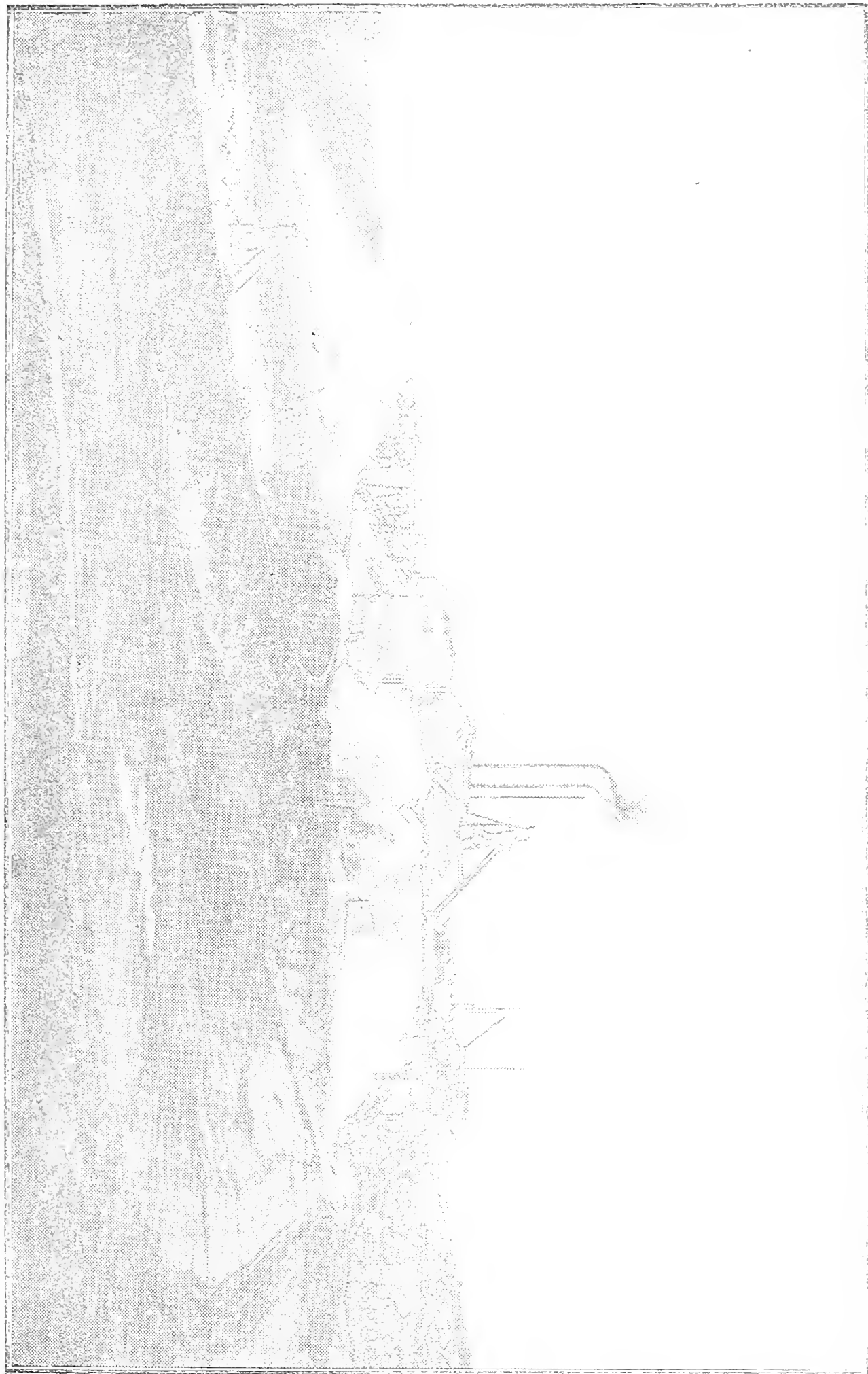
The Gray Rock mine is down 1,600 feet and is timbered with round timbers framed into square sets, the air being fairly good, connections being made with the West Gray Rock, Diamond, East Gray Rock, and a raise to the surface. The mine is equipped with a 20"x48" cylinder Chicago Iron Works Engine, flat cable $\frac{1}{2}$ "x6" two double deck cages and an electric bell system. Twenty-eight drills are operated with a Nordberg air compressor. There are 245 miners employed and 35 top men. Mr. H. E. Emerson is the foreman.

THE BERKLEY MINE.

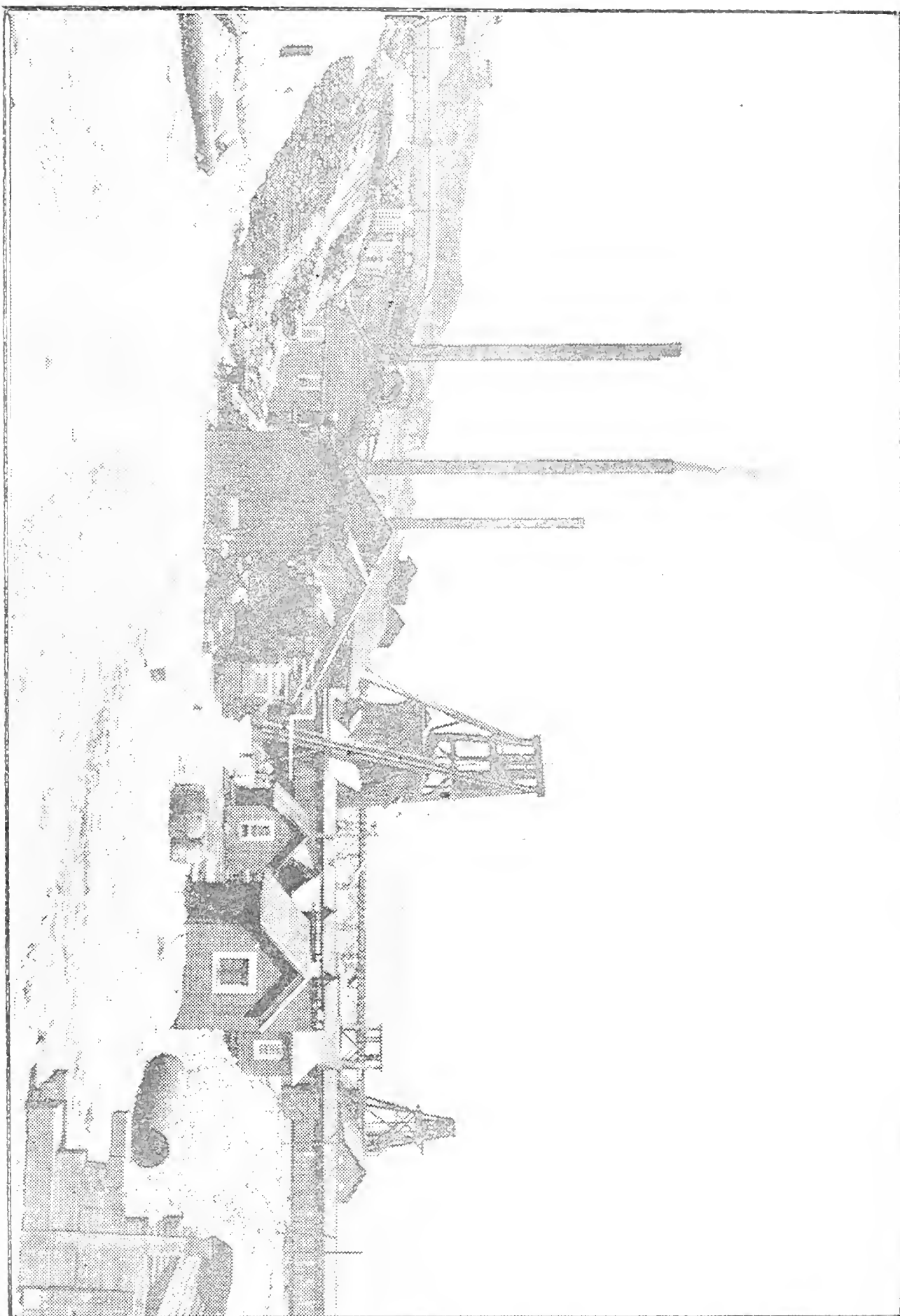
Mr. W. E. Kane is the foreman of the Berkley mine, which employs 90 miners and 10 surface men. The mine has an 800-foot shaft with two compartments, equipped with a Wedge engine, 18"x32" cylinder, 1" round rope and two single deck cages.

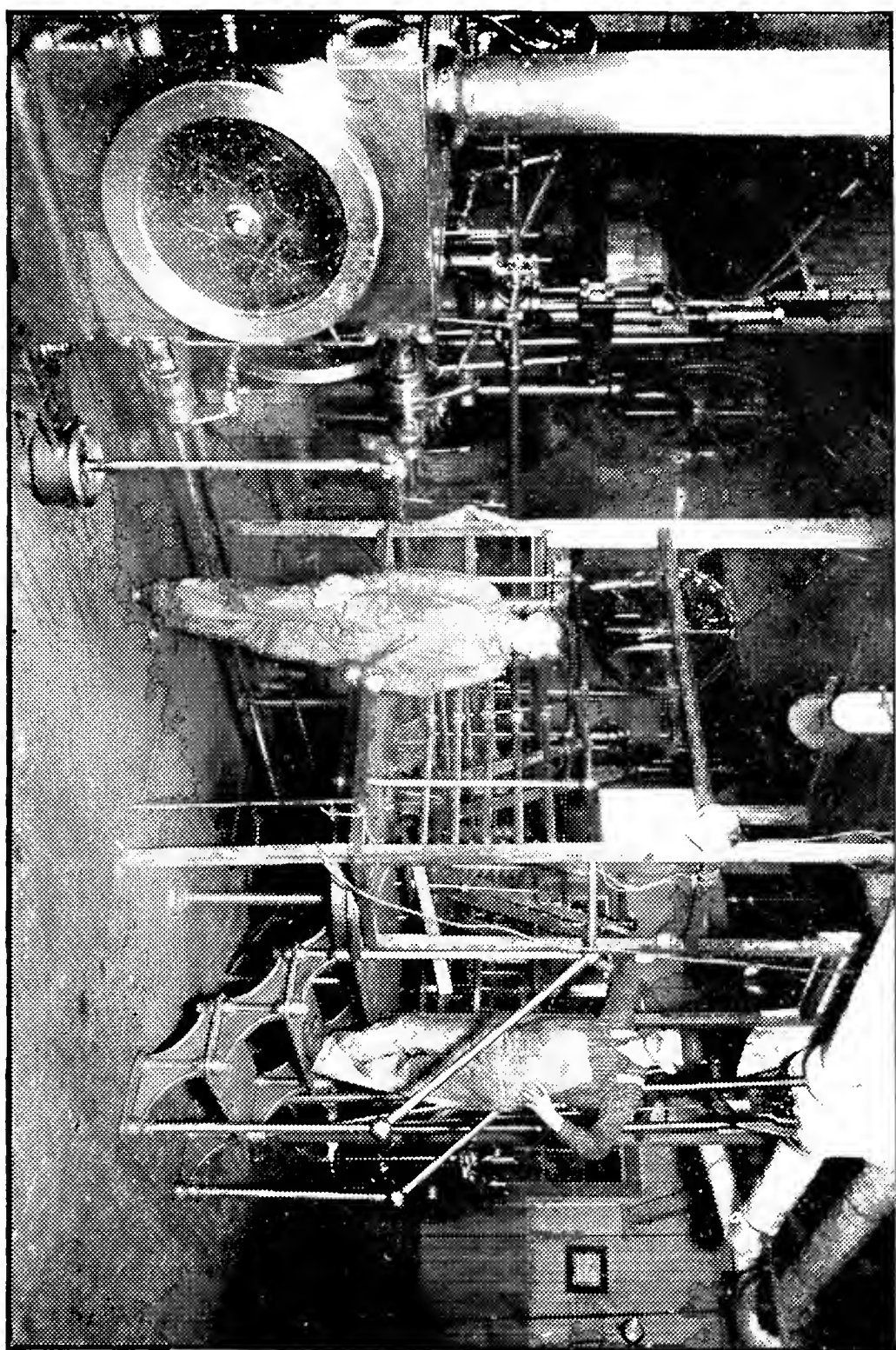


1,200-FOOT STATION PUMP, LEONARD MINE, BUTTE



MINNIE HEALY MINE, BUTTE





HOIST AT ORIGINAL MINE, BUTTE

The mine is timbered with both square and round timbers, and the ventilation is good. Litigation compelled the closing of this property for several years, but now it is working up to its present capacity.

THE KANE SHAFT MINE.

The Kane shaft is two compartment and is down 200 feet, being equipped with an engine, cable and single deck cage. The foreman is Mr. William McLane, employing 14 miners and 7 surface men.

THE WASHOE COPPER MINE.

The mines operated by this company during 1906 were the Moonlight, Clear Grit and Pauline and Pacific, employing 235 miners and 68 surface men.

THE MOONLIGHT MINE.

This is one of the best timbered mines in the district, and is also well filled. The ventilation is good, making air connections with the Anaconda, Never Sweat and Parrot. The main shaft is three compartment and is down 1,500 feet, being equipped with a Dixon engine, 20"x48" cylinders, flat cable $\frac{1}{2}$ "x6", two double deck cages and electric bell system of signals. The timbering is round, 10x10, framed in square sets. There are 160 miners employed and 3 top men, Mr. W. H. Price being the foreman.

THE CLEAR GRIT MINE.

Mr. Josiah Knight is the foreman of the Clear Grit mine, which employs 13 miners and 7 top men. The two-compartment shaft is down 600 feet and there is a winze down an additional 250 feet, the workings being equipped with 10"x10" cylinder engine, 7-8ths round cable and bucket. Good ventilation is secured by connection with the West Stewart and Mountain Con. The mine is at present being worked through the Mountain Con shaft.

THE PAULINE-PACIFIC MINE.

The main shaft of the mine is down 1,500 feet, but at present no work is being done below the 600-foot level. The air of the workings is good, being connected with the Mountain Con and other mines, and the Stella shaft is being retimbered to the 600-foot level. The property is equipped with a 14"x16" engine, 1 1-8th round cable, and two double deck cages. Mr. Joseph Knight is the foreman, employing 50 miners and 15 top men.

THE BUTTE COALITION COMPANY.

The mines operated during the present year by the Butte Coalition Company are the Rarus, Minnie Healey, Cora, Nipper, Tramway, Red-Penn, and part of the Alice. The company employs 902 miners and 201 surface men.

THE RARUS MINE.

There are 340 miners, 98 surface men and three engineers employed in the Rarus, the workings of which are now down 1,600 feet, 50 feet of which was sunk during the present year. The workings are equipped with a Webster, Camp & Lane, 32"x72" cylinder, engine, flat cable 3-8"x 7 1-2", and two double deck cages with 6-ton skips attached. The mine is timbered with round 10x10 timbers. The ore is trammed with mules and dumped into skip chutes at the different stations, hoisted and automatically dumped into the surface bins. Formerly considerable difficulty was experienced with the ventilation, but recently air connection has been made with the Minnie Healey, West Colusa and Pennsylvania, making a great improvement both in the circulation and volume, and the company is now making an airway to the surface by both sinking and raising, 1,000 feet of the work having been completed at the time of inspection, and the balance of the distance, 400 feet, will be completed by the first of the year. The pumping plant consists of a Worthington with a capacity of 500 gallons per minute, located on the 800-foot level, and an electric pump of 420 gallons per minute capacity, located on the 1300 foot level. This station

was very warm when the pumping was done by steam, but since the installation of electric power here, the station as well as the shaft have been reduced in temperature. There is also on the 1,300 foot level a 500 gallon Zanesville pump, and on the 1,400 foot level a 500 gallon Knowles pump and two Cameron pumps with a capacity of 250 gallons each, and two Cameron sinkers in the shaft with a capacity of 200 gallons each. The flashlight system of signals is used. Mr. William Moody is the foreman.

THE CORA MINE.

Mr. George Moulthrop is the superintendent and Mr. John Finnegan is the foreman of the Cora mine, and employ 300 miners and 40 surface men. The main shaft has two compartments, 18 levels, and is down 2,200 feet, the shaft from the 800-foot level being made three compartment. The workings are equipped with a 38"x72" Webster, Camp & Lane engine, 1½"x7" flat cable, two double deck cages with 6-ton skips and electric flashlight signal system. The mine is timbered with 10x10 round timbers, and is one of the best timbered and filled mines of the company holdings. The ore is trammed with men and mules. The skips are loaded at different stations and are dumped into the surface bins automatically. An Ingersoll compressor provides the power for 40 drills. The ventilation of the mine is fairly good, being connected with an old shaft that is down 900 feet and connection is now being made with the 2,000 foot level of the Diamond.

THE MINNIE HEALEY MINE.

Mr. Geo. Moulthrop is also superintendent of the Minnie, and Mr. John Kane is the foreman. The mine employs 250 miners and 60 surface men, and three surface engineers. The mine has a 3-compartment shaft 1,100 feet in depth, equipped with a Webster, Camp & Lane engine, 20"x40" cylinders, flat cable 1½"x6" two double decked cages with 5-ton skips, and an electric flashlight signal system. The mine is timbered with round 10x10 timbers and 140 feet between the 100 and 400 foot levels have been recently retimbered. The ventilation of the mine has not

been good. The mine has been supplied with compressed air from the Rarus mine. Connections have now been made with the Rarus, and are also being made with the West Colusa and Leonard and with the shafts of the Tramway.

THE TRAMWAY MINE.

Mr. George Moulthrop and Mr. John Kane are also respectively superintendent and foreman of the Tramway, which employs 12 miners and 3 surface men. The shaft is a 2-compartment, down 500 feet, and is equipped with a steam engine, $\frac{1}{2}$ "x14" cylinders 1" round cable and a single deck cage. The company intends sinking to the 1,100 foot level and also connecting with the Minnie Healey at the 600 foot level. The company is also working its ground through the West Colusa, and is working the Nipper through the Parrot and the Red-Penn. through the Pennsylvania.

THE TRENTON MINING & SMELTING CO.

THE GAGNON MINE.

The Gagnon is under the superintendence of Mr. B. H. Dunschee, the foreman being Mr. Jerry Sullivan. There are 256 miners employed in the mine and 35 surface men. The main shaft is down 2,000 feet, 50 feet of which was put down during the present year. The shaft has three compartments and is equipped with a Dixon engine, 28"x48" cylinders, 1 1-8 round cable, two double deck cages when lowering men, and changing when hoisting rock by putting on two 3-ton skips, and an electric call bell system. A Rand compressor drives 10 drills, and two electrical pumps have been installed, one with a capacity of 100 gallons per minute on the 2,000 foot level, and one of 200 gallons capacity on the 1,000 foot level. The air in the mine is very good, raises having been made and connected to the surface and air connections made with the Original mine. The mine is timbered with square sets made from round timbers.

THE PARROT SILVER AND COPPER CO.

THE PARROT MINE.

The three compartment shaft of the Parrot mine is down 1,900 feet. The power is furnished by a Union Iron Works, 28"x96" cylinder engine, having a hoisting capacity of 10 tons, 3,000 feet. The shaft is equipped with an electric call bell system, a flat cable 5-8"x8", two double reek cages with 10-ton skips. The ore is hoisted and automatically dumped. The mine is timbered with 10x10 round timbers, and the ventilation is good, having two surface connections with the Blue Jay shaft at the 1,000 foot level, and the Original No. 6 at the 1,200 foot level. The property also has a fine compressor plant consisting of an Ingersoll-Sergeant compressor with a capacity of 80 drills, and a Rand compressor with 20 drills. There is also a good dry with cement floor and 250 lockers and 12 shower baths on each floor. Mr. Harry Gallwey is the manager, and Mr. Dan Griffin the foreman employing 200 miners and 20 surface men, and three engineers.

THE ORIGINAL NO. 6 MINE.

Mr. Harry Gallwey and Mr. Dan Griffin are respectively the manager and foreman of this mine also, employing 10 miners and 3 surface men. The main shaft is down 1,000 feet and is equipped with a Montana Iron Works engine, 15"x30" cylinders, round cable and single deck cage. The mine is timbered principally with stulls, using round timber. Ventilation is secured through connection with the Parrot mine.

THE NORTH BUTTE MINING COMPANY.

The mines being worked by this company are the Speculator, Edith May and Jesse. Mr. A. C. Carson is the general manager and Mr. John D. Pope is the foreman. The company gives employment to 518 miners and 124 surface men.

THE SPECULATOR MINE.

This mine is rated as one of the largest producers of the district, having extensive bodies of ore blocked out, and the company is now engaged in prospecting the northern veins that it is thought will prove exceptionally productive, and which have as yet been but superficially prospected. The properties are all worked through the same shaft. The main 3-compartment shaft is down 1,700 feet, 100 feet having been sunk during the present year, and last year the shaft was entirely retimbered. The mine is equipped with a steel gallows frame 120 feet in height, a Nordberg, 32"x72" cylinder, engine, etc. The mine is timbered with 10x10 round timbers. The ore is taken from skip chutes at the several levels and is automatically dumped into the surface ore bins. The air in the North Butte property is good, having connections with the High Ore and a raise to the surface.

THE ORIGINAL MINING AND SMELTING COMPANY.

The mines operated by this company during the year 1906 were the Original the West Stewart, and the Ellamalu. The properties are owned by Mr. W. A. Clark. Mr. A. H. Wethey is the general manager and Mr. Thomas Bryant is the superintendent. The mines give employment to 563 miners and 73 surface men.

The mines are equipped with all of the most improved machinery and have a large compressor room with an Ingersoll-Sergeant compressor with a capacity of 60 drills, and providing air for both mines. There is a fine machine shop and one of the most complete timber framing plants in the district where all regular timbers for the mine are framed. A fully appointed dry has accommodations for 350 men.

THE ORIGINAL MINE.

Mr. Thomas Bryant is the superintendent of the Original mine, and Mr. William Bailey the foreman. There are 330 miners working in the mine and 36 surface men. The main shaft is down 2,200 feet, which is 2-compartment for 700 feet and the balance of the shaft is 3-compartment. The workings are equipped

with a Nordberg engine, 32"x72" cylinders, 1½" round cable, two double deck cages with 7-ton skips and electric call bell system. The cages are cased in with iron on three sides, only hoisting from one side of the shaft. The tramming is done by men. This mine is timbered with round and square timbers, using square caps with round posts and girts. In my opinion this is a good system, as it allows the laying of good floors, a square cap catching the girts better than a round one, as round caps are not uniform in size, and are smaller at one end than the other. The mine is closely filled and well timbered. The air in the stopes is warm. The company is now opening the old shaft that is down to the 1,100-foot level and will upraise from the lower workings, and is also making connections with the 1,700-foot level of the West Stewart and with the Gagnon, and when these improvements are accomplished the ventilation of the mine will be good.

THE WEST STEWART MINE.

The West Stewart mine is in fine condition, being well timbered and filled, and the ventilation is good, being connected for air with the East Stewart shaft, which is down 1,300 feet, by raises from the lower workings, and by connections with the Original, Mountain Con and the Clear Grit. The main shaft of the mine is down 1,900 feet and is three compartment, being equipped with a Nordberg engine, 32"x72" cylinders, 1½" round cable, two double deck cages with 7-ton skips, and an electric call bell system. The tramming is done with horses. Mr. Thomas Bryant is the superintendent, and Mr. Thos. Kilgallon is the foreman. There are 235 miners employed and 20 surface men.

THE ELLAMALU MINE.

The company is now erecting a gallows frame and engine house, and intend to sink the shaft 1,000 feet. The machinery equipment consists of a 14"x16" cylinder engine, a 1 1-8th" round cable and single deck cages. Twenty men are now employed.

THE PITTSBURGH & MONTANA COPPER COMPANY.

THE PITTSBURG MINE.

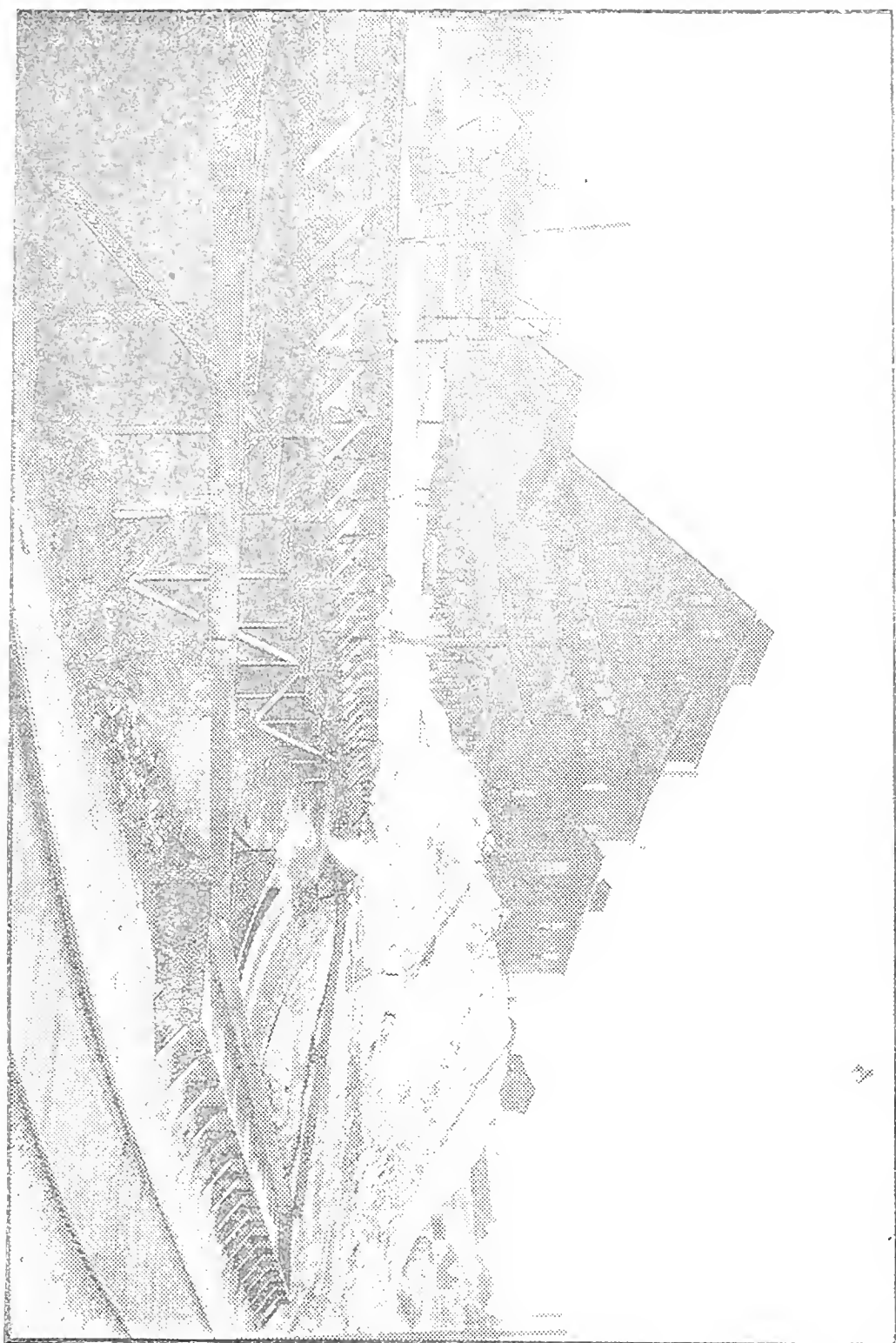
The Pittsburgh mine has one of the most complete surface plants of the district, Mr. Oscar Rohm being the superintendent. There is a thirty-room dormitory with a bath in each room, a dry with accommodations for 300 men, and having 16 shower baths, and elaborate office compartments. Mr. Andy Ray is the foreman, the mine employing 175 miners and 65 surface men.

Shaft No. 1 is a three-compartment that is down 1,200 feet, being equipped with a 15"x30" steam engine, 1 1-8th round cable and single deck cage. No. 2 is also a three-compartment shaft, equipped with a Griffith & Wedge engine, 16"x32" cylinders, 1 1-8th" round cable and two single deck cages. This is the main working shaft. The mine is timbered with 10x10 round timbers, and the air of the workings is good, the two shafts being connected with a 2,000 foot crosscut that affords the most ample circulation. The mine is well timbered. Besides the machinery equipment stated there is an Ingersoll-Sergeant compressor with 20 drills, two centrifugal pumps on the 1,200 foot level, hoisting 1,000 gallons per minute to the surface, and two Knowles steam pumps with a capacity of 500 gallons, that are located at the 700 foot level.

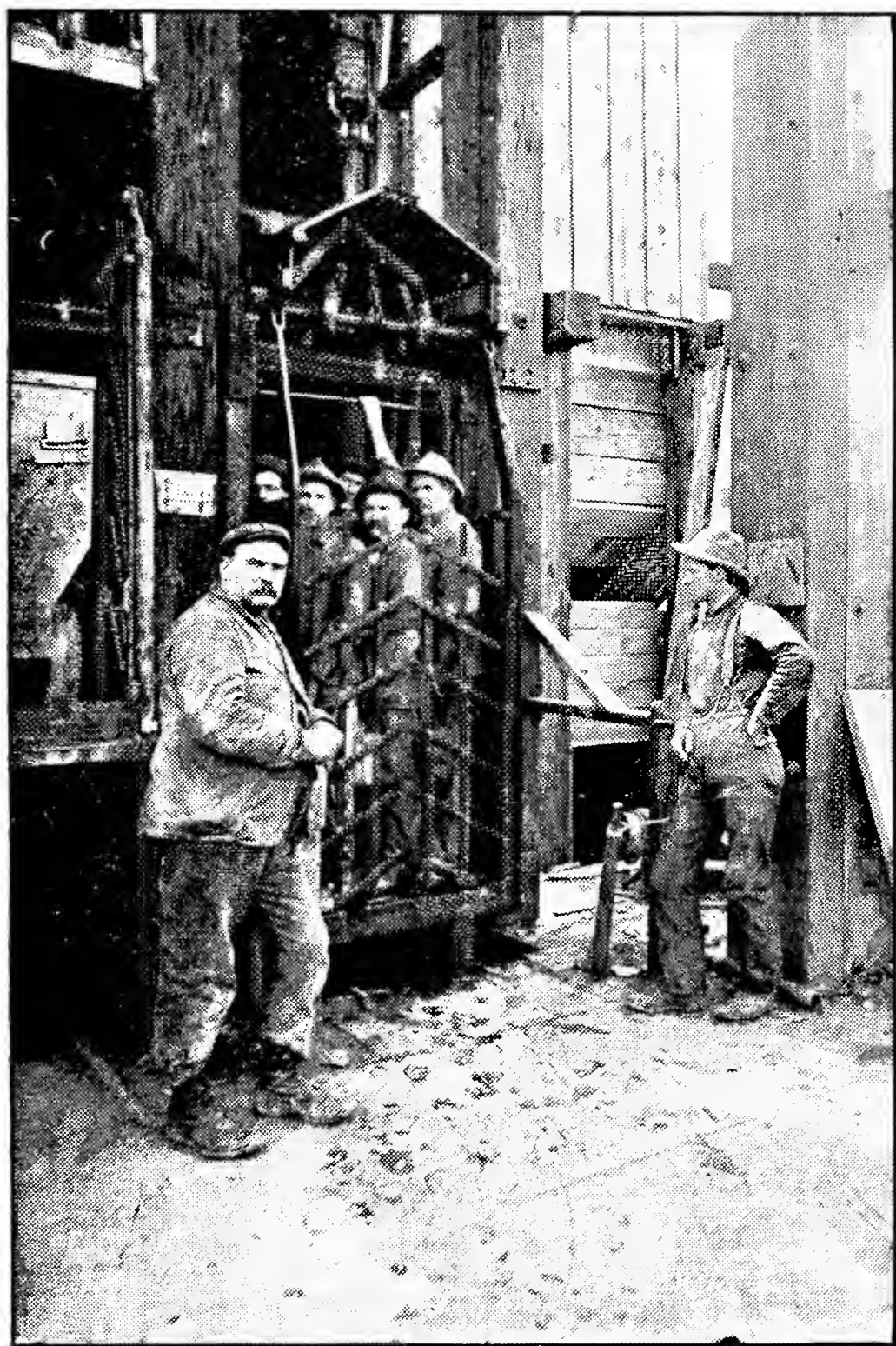
ELLINGWOOD & COMPANY.

THE GOLDSMITH MINE.

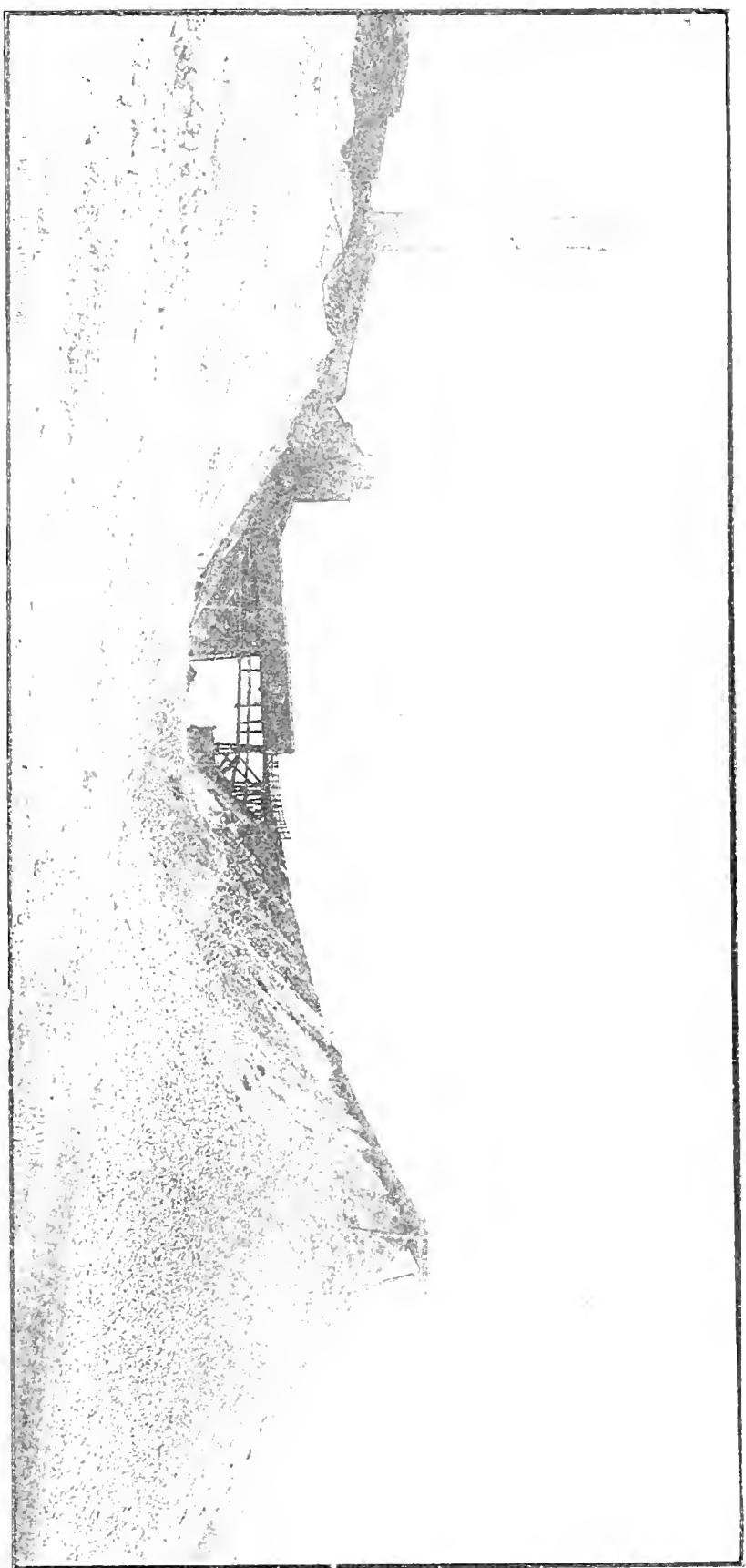
The Goldsmith mine employs 60 miners and 20 surface men, Mr. Ellingwood being the superintendent and Mr. Richards the foreman. The mine has two shafts, No. 1 being a two-compartment incline that is down on the vein 250 feet, and No. 2 is a two-compartment vertical shaft, and is equipped with a Bullock engine 8½"x12" cylinders, and 7-8ths" round cable and bucket. No. 2 is equipped with an Anaconda engine, 8"x10" cylinders, and 1" round cable, and single deck cage. The mine is timbered with round timber, stulls principally being used. At present the hoisting is being done through the old Amy-Goldsmith shaft,



EAST STEWART MINE, BUTTE



CAGE W, STEWART MINE, BUTTE



SILVER BOW MINE NO. 1, BUTTE

which is down 300 feet, and is connected with the vertical shaft, this shaft being equipped with a 14"x16" engine and one single deck cage. The veins of this property lie at a considerable dip and the mine is not worked extensively, but has paid \$125,000 in royalties during the past two or three years. The mine was purchased from the Tong estate by Ellingwood & Co., for \$50,000. The ore is rich and the largest values run in silver. The ventilation of the workings is good, connections being made with other shafts.

THE REINS COPPER COMPANY.

THE REINS MINE.

The main shaft of this mine is down 1,200 feet, is two-compartment from the surface down to the 800 foot level and three-compartment from that level down to the bottom. Two hundred and fifty feet of the shaft was constructed during the present year. The shaft is equipped with an Ottawa engine, 16"x32" cylinders, 1 1-8th" round cable and a single deck cage. A Knowles pump with a capacity of 700 gallons per minute is installed at the 800 foot level, and a Janesville pump at the 600 foot level. Doc. Reins is the manager of the company, Mr. Thos. Bryant is the superintendent, and Mr. John Stewart the foreman. The mine employs 30 miners and 12 top men.

MESSRS. FUREY & COMPANY.

THE EAST GRAY ROCK MINE.

The East Gray Rock mine is owned by the Butte & Boston company, and is being worked under lease by Messrs. Furey & Co., who are employing 10 miners, three surface men and three engineers. The shaft is 1½-compartment and is down 235 feet, and is equipped with a steam engine, round cable and bucket. The mine is timbered with round timbers.

MESSRS. McCARTHY & RILEY.

THE BELL NO. 4 MINE.

This property is owned by the Anaconda Company and is leased to Messrs. McCarthy & Riley, Mr. Riley being the foreman, and employing 18 miners and 7 surface men. The main shaft has two compartments and is down 365 feet, the equipment being an Anaconda engine, $\frac{3}{4}$ ths" round cable and bucket. The timbering is done with round timber.

MR. MIKE O'FARRELL.

THE MONITOR MINE.

The Monitor Mine is owned by the Anaconda company and is being operated under lease by Mr. Mike O'Farrell, employing five miners and one surface man. The main shaft is two-compartment and is down 200 feet, equipped with an Ottawa engine, round cable and single deck cage. The mine is timbered with round timbers, is well filled and is in good condition.

MESSRS. MURPHY & LAYTON.

THE BLIND JACK MINE.

The Blind Jack mine is owned by the Anaconda company and is leased to Messrs. J. A. Murphy and J. A. Layton, the latter being the foreman of the mine. The shaft is 1½-compartment, and is down 300 feet, equipped with an engine, round cable, etc. The timbering is done with round timbers.

MESSRS. LALLY & WHALEN.

THE MODOC MINE.

The Modoc mine is owned by the Anaconda company and is under lease to Mr. Pat. Lally and Mr. Whalen. The mine is employing six miners and two surface men. The 3 compartment shaft is down 1,000 feet and is equipped with an engine, round

cable and single deck cage. The mine is timbered with round timbers.

THE BUTTE-SUPERIOR COPPER COMPANY.

THE BLACKROCK MINE.

The Blackrock mine is owned by the Butte-Superior Copper company, Col. Peake being the superintendent and Mr. John Kirk the foreman. Twenty miners are employed in the mine, and three surface men. The company has purchased several adjoining claims and intend developing these through the workings of the Blackrock. The shaft on this property is down 500 feet, is 3-compartment, and is now being thoroughly retimbered. On completion of this work the shaft will be sunk to the 1,000 foot level and exploration of the several claims made from the attained depth. The present machinery consists of a Frazer engine, 8"x12" cylinders, 7-8ths" round cable and single deck cage. The shaft is timbered with 10x10 and 12x12 timbers.

THE ALICE COMPANY.

THE ALICE MINE.

What is known locally as the Alice, consists of a group of twenty claims, and though not being operated during the present season, it is understood that operations on the group will shortly be inaugurated on a large scale. The Alice has a 3 compartment shaft down 1,500 feet, equipped with a Griffith & Wedge engine, 12"x16" cylinders, 7-8ths" round cable and two single deck cages. The mine is timbered with round 10x10 timbers. There are large reserves of low grade silver ore in the mine, that at the present price of silver will yield a profit. The manager of the property is Mr. J. D. Ryan and the foreman is Mr. T. H. Williams.

THE WEST GRAY ROCK MINE.

The West Gray Rock mine is owned by the Butte & Boston company, and is being worked by several associations of leasers.

The main shaft is a 2-compartment, down 700 feet, equipped with an engine, round cable and single deck cage. Forty miners and two surface men are engaged in the mines.

THE EAST BUTTE COPPER MINING COMPANY.

THE SYMON, LARSON, IDONA AND YANKEE BOY MINES.

These properties are operated with Mr. Pat Wall as manager and Mr. Jim Wall as foreman, employing 175 men underground and 75 surface men. The machinery equipment consists of an engine, 14"x18" cylinders, 1 1-8th" round cable and single deck cage, operating a 3-compartment shaft that is down 500 feet, which was sunk during the present year. There are several other shafts on the properties that are being worked under leases, and a new 3-compartment shaft has been sunk near the Yankee Boy to a depth of 250 feet, this shaft being equipped with a steam engine, etc. This work was also done during the present year. These properties are producing about 250 tons of ore daily.

EAST BUTTE EXTENSION COPPER MINING CO.

THE EAST BUTTE NO. 1 EXTENSION MINE.

Shaft No. 1, which was constructed during the present year, is a 2-compartment and down 200 feet, being equipped with an 8"x10" cylinder engine, round cable and single deck cage. Shaft No. 2 is being sunk and is now down 150 feet and similarly equipped. The company also owns the shaft on the West Lake and is producing considerable ore. The company has considerable undeveloped ground.

MR. E. W. KRUEGER.

THE UNION MINE.

The Union mine is owned by the Lexington company and is being operated under lease by Mr. E. W. Krueger, who is em-

ploying 10 miners and 3 surface men. The 2-compartment shaft is down 200 feet and is equipped with an electrical engine. The mine is timbered with stulls, using round timbers.

THE OPHIR MINE.

The Ophir mine is owned by Dr. Blackburn and is operated under a lease, Mr. Samuel McConnell being the manager and foreman. Thirty miners and 18 surface men are employed. The main shaft is down 500 feet, 200 feet of which was constructed during the present year. Part of the shaft is in two and part of it in three compartments. The timbering is done with both square and round timbers. The equipment consists of a Montana Iron Works engine, round cable and single deck cage. Ventilating circuit is secured with a raise to the surface connecting all the workings.

THE BUTTE & BACORN MINING COMPANY.

This company is operating three shafts, Mr. F. W. Bacorn being the manager and Mr. Tonkin the foreman.

THE BELINDA MINE, CALUMET & HECLA AND COLEEN BAWN MINES.

The shaft on the Belinda is now down 450 feet, and at 500 feet the company will run a crosscut. The shaft is equipped with an Ottumwa engine, 12"x14" cylinders, 1 1-8th round cable and single deck cage. The shaft on the Calumet & Hecla is down 450 feet and is similarly equipped. This is a three-compartment shaft. The Coleen Bawn main shaft is a 2-compartment, down 450 feet, and has the same equipment as the other shafts. All of this work has been done during the present year. It is the intention of the company to sink the shafts to the 1,500 foot level. There are 36 miners and 9 top men employed in the development work.

THE RELIANCE MINE.

Mr. Malcolm Gillis is the superintendent of this property and Mr. Charles Geyman is the foreman. Twelve miners and three top men are employed. The main shaft has two compartments and is down 200 feet, all of the work having been constructed during the present year. The shaft is operated with a Ledgerwood engine 8"x10" sylinders, 7-8ths" round cable, etc.

THE MATTHEW MINE.

The Matthew mine is owned by the East Butte company and is operated by Mr. Matthews, who is working 12 miners and 3 surface men, the 2-compartment shaft being down 200 feet. The timbering is with 8x8 timbers. The equipment is a steam engine, round cable and bucket.

THE DALY MINE.

This mine is also owned by the East Butte company and is being operated under lease by Messrs. Daly & Co., the manager being Mr. Pat Sheehan. The main shaft has been put down 150 feet during the present year, and is timbered with 8x8 timbers, and equipped with a steam engine, round cable and bucket. Twelve miners and three top men are employed.

THE BUTTE-MILWAUKEE MINING COMPANY.

THE POLLOCK MINE.

This company owns several adjoining claims, but the present development is confined to the Pollock claim, on which a shaft has been sunk 350 feet, the shaft being 1½-compartment. The machinery equipment is a steam engine round cable and bucket. Six miners and three surface men are employed. Mr. G. A. Nickey is the superintendent and Mr. John Miles is the foreman.

THE BUTTE HILL COPPER COMPANY.

Mr. Tom Driscoll is the superintendent of the property of the

company and Mr. Dan Mulchare is the foreman of the mine. Four miners and one top man are employed. The shaft is 2-compartment and is down 200 feet, equipped with engine, rope, etc. The timbering is done with round timbers. The company has several claims, but the present work is being done through the Butte Hill shaft.

THE EAGLE MINING COMPANY.

THE EAGLE MINE.

Mr. Tom Bryant is the superintendent of the Eagle mine and Mr. Pat Hanley is the foreman. The shaft is down 200 feet on an incline, the work having been done during the present year. The timbering is done with round timbers. The equipment is a Ledgerwood engine, 10"x12" cylinders, 7-8ths" round cable and bucket. Four miners and three top men are employed.

BUTTE SUMMIT VALLEY COMPANY.

THE LITTLE BOY MINE.

The company has several adjoining properties, but at present is confining its development to the sinking of a shaft on the Little Boy claim, having two shafts down, one 250 and the other 225 feet, the equipment of the latter being a Griffith & Wedge engine, round cable and single deck cage. Mr. M. L. Holland is the superintendent and Mr. Charles D. Horton is the foreman, 27 miners being employed and 5 top men.

THE ALEX. SCOTT MINE.

This property is owned by the Butte-Montana company, and is developed with a 3 compartment 700 foot shaft that is timbered with round timbers and is equipped with a Fraser & Chalmers engine, round cable and single deck cage. Mr. A. S. Avery is the superintendent and foreman. The mine employs 20 miners and 7 top men.

THE TOULOMME MINE.

The superintendent of this property is Mr. Pat Sheehan, who also acts as foreman. The main shaft is down 350 feet, 200 feet of which was sunk during 1906. The shaft has three compartments and is timbered with 12x12 timbers, and equipped with a Handerson & Boothoff engine, round cable and single deck cage. There are 18 miners and 8 top men employed.

THE IDA & MONTANA COMPANY.

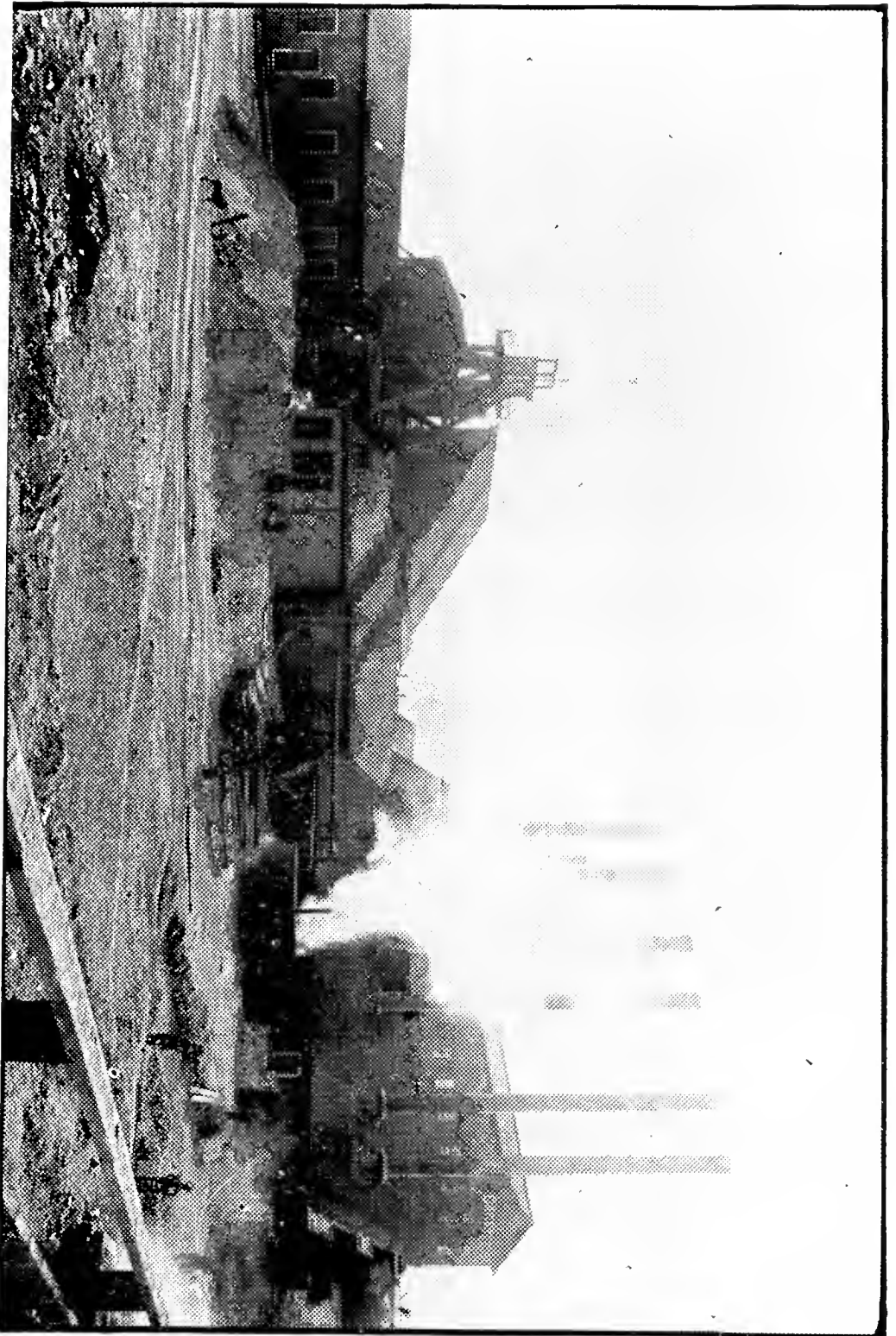
The property of this company is operated under the superintendence of Mr. E. J. Krause, Mr. M. J. McEvans being the foreman. The main shaft has three compartments and is now down over 120 feet, being timbered with 10x10 timbers, and equipped with a Fraser & Chalmers engine, 1 1-8th" round cable and bucket. This development work has been accomplished during the present year. There are 12 miners and 8 top men employed.

THE DAVIS-DALY ESTATES COPPER MINING CO.

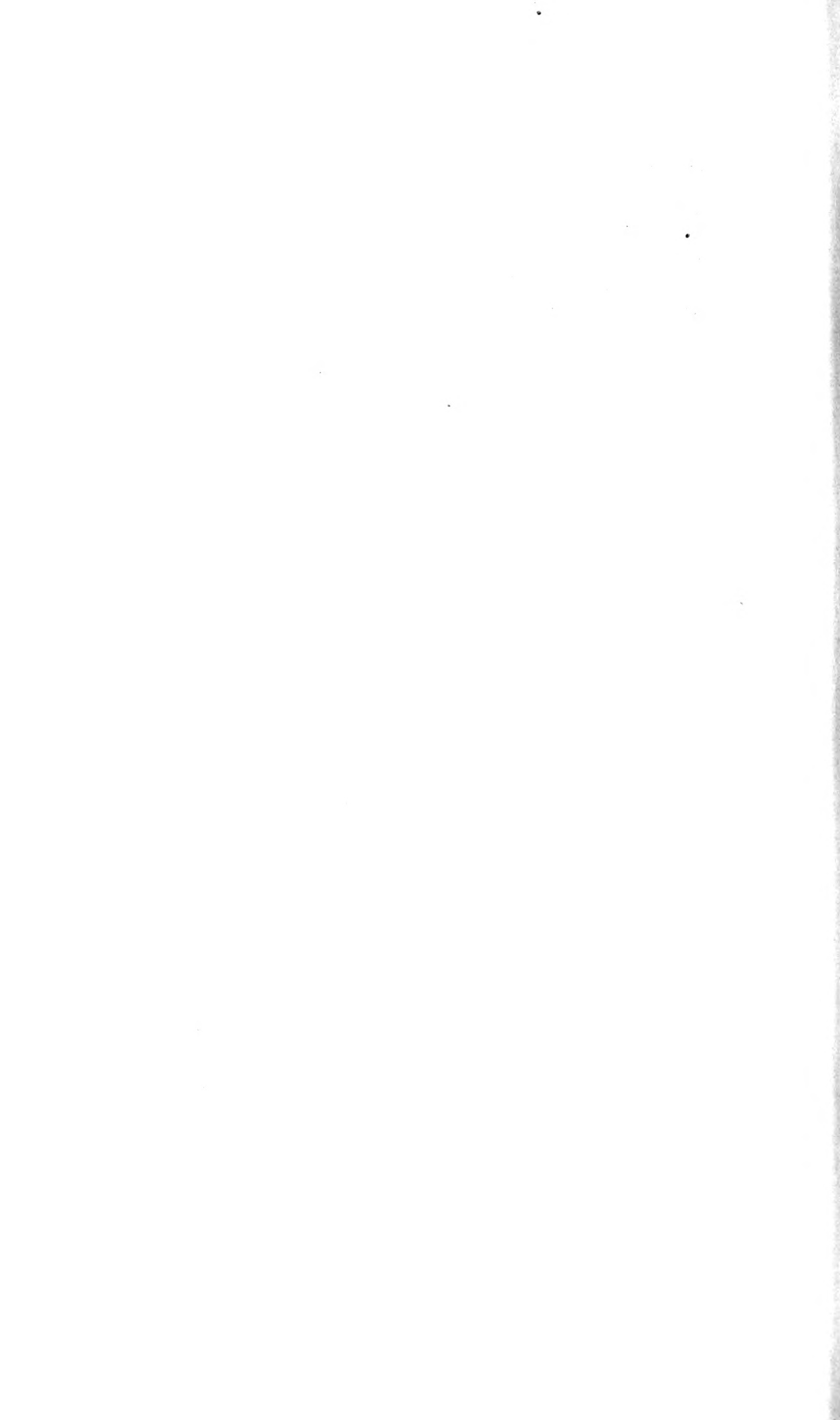
The Smoke House Mine, The Mount Moriah and Colorado.

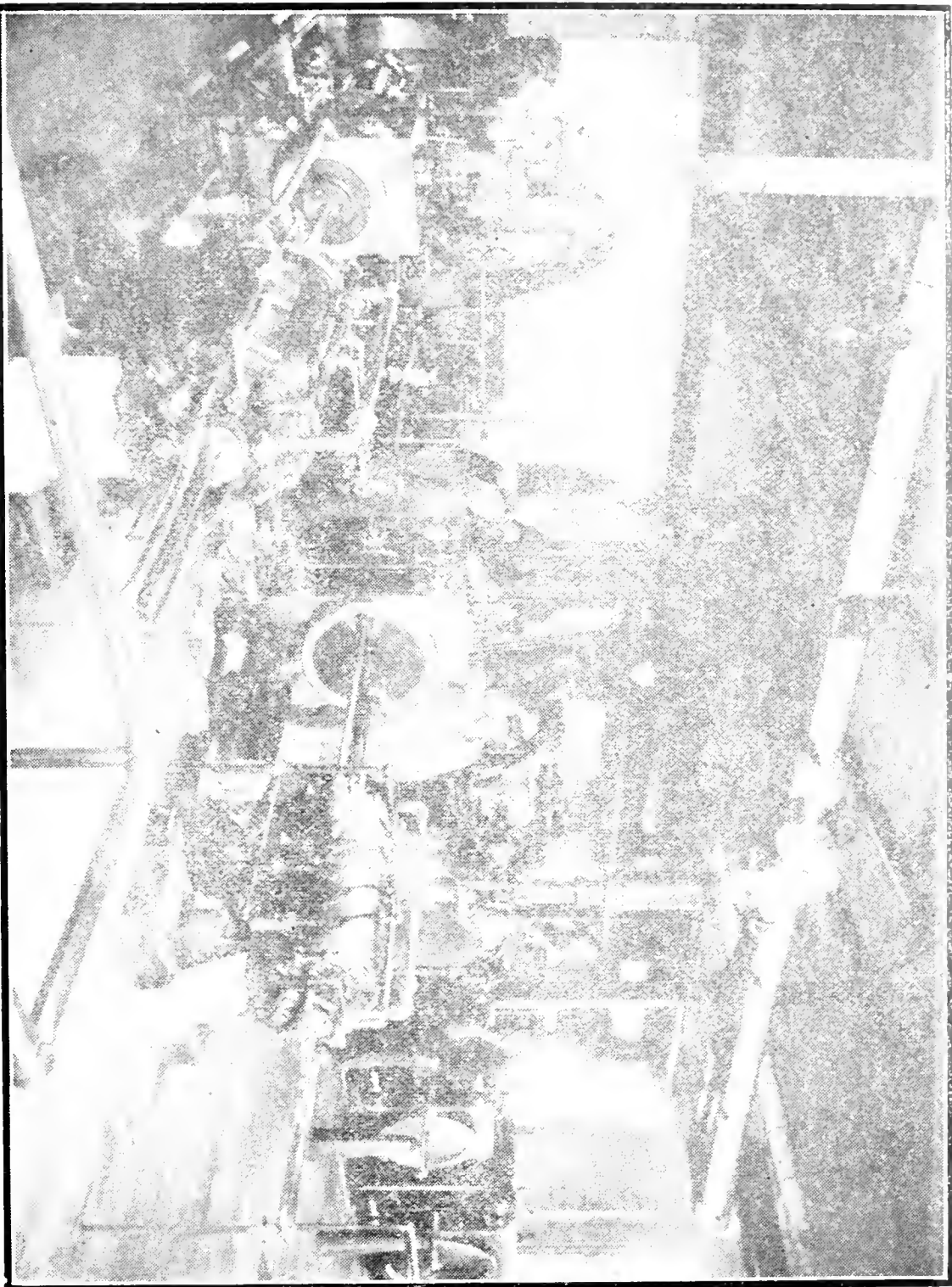
Capt. Palmer is the manager, Mr. Wm. Kidney the superintendent, and Mr. J. Rowe the foreman, 36 miners and 14 top men being employed at the several works.

The main shaft of the Smoke House mine is a 2-compartment, down 300 feet, timbered with 10x10 timbers and equipped with an electrical engine and 7-8ths" cable. The main shaft on the Mount Moriah is down 300 feet, 60 feet of the sinking being done during the present season. The first 100 feet of the shaft is one-compartment and the balance three-compartment, equipped with an Allis-Chalmers engine, 10"x16" cylinders, and 7-8ths" round cable. Mining is done with an Ingersoll-Sergeant compressor driving 10 drills. The main shaft of the Colorado is a two-compartment and is down 540 feet, 140 feet of which was sunk during the present year. The timbering is with 10x10 timbers. The equipment is a Ledgerwood engine, 12"x16" cylinders, 1" cable and one single deck cage. The company is also driving



GENERAL VIEW OF THE ORIGINAL MINES, BUTTE





COMPRESSOR POWER HOUSE LEONARD MINE, BUTTE

a crosscut from the 1,800 foot level of the Original, prospecting some of their adjoining ground.

THE SCOVICH MINE.

Mr. Gus Miller is the manager and the foreman, employing 12 miners and one top man. The depth of the main shaft is 125 feet, having been sunk during 1906. The shaft has two compartments and is timbered with round timbers. The equipment is a steam engine, 7-8ths" round cable and bucket.

THE BUTTE & LONDON COPPER COMPANY.

This company has a large block of land and has sunk a development shaft during the year, 700 feet, and intend continuing the shaft, which is a 3-compartment, to the 1,400 or 1,500 foot level, and crosscutting their ground from the attained levels, expecting to penetrate large bodies of ore. The shaft is timbered with 10x10 timbers and equipped with an Ottumwa engine, 14"x18" cylinders, 1 1-8th" round cable, and a single deck cage. The manager of the company is Mr. Archie McMillan, and the foreman of the mine is Mr. Hanley. There are 21 men employed underground and 12 top men.

THE BUTTE EXPLORATION COMPANY.

Mr. McGee is the superintendent of the Butte Exploration company and Mr. Thos. Heatherly is the foreman. The main shaft of the mine is down 1,000 feet, 400 feet having been sunk during 1906. The shaft has three compartments, and is timbered with 10x10 timbers. The equipment consists of a steam engine, 10"x14" cylinders, 1 1-8th" round cable and single deck cage. A development crosscut will be run from the 1,000 foot level. The mine employs 12 miners and 10 top men.

THE BULLWHACKER MINE.

The company's shaft is down 400 feet, and at the 100 and

200 foot levels developed ore in a cross vein that is from twelve to fifteen feet in width. The shaft is 2 compartment and timbered with 10x10 timbers and equipped with a steam engine and round cable. Mr. John Bresbahan is the manager and the foreman.

THE LA FRANCE COPPER COMPANY.

THE LEXINGTON MINE.

Mr. F. Aug. Heinze is the general manager of the company and Mr. William Kidney is its superintendent, Mr. John Bouck being the foreman. The mine employs 150 miners and 50 top men. The main shaft is a 3 compartment, down 1,450 feet, and is equipped with a Frazer & Chalmers engine, 20"x60" cylinders, 11 8th" round cable, and one double deck cage. The timbering is done with 10x10 round timbers. The mine workings are in good condition and the ventilation is good, having surface connections. The mine at present is only being worked above the 500 foot level, but the water has been pumped out to the 1,000 foot level, 400 feet of the unwatering having been accomplished during the present season. The pumping plant consists of two Aldrich electric pumps with a capacity of 400 gallons per minute, each, a Worthington centrifugal pump with a capacity of 800 gallons per minute, and a tank with a 1,000 gallon capacity.

THE CALUMET & HECKLA MINE.

The mine has a two compartment shaft down 310 feet, 200 feet of which was constructed during 1906, the timbering being done with 8x8 timbers. The machinery equipment is an Anaconda engine, round cable and single deck cage. Mr. Thos. Lutey is superintendent and foreman. Six miners and eight top men are employed.

THE BUTTE COMPANY.

THE ST. ELMO MINE.

Mr. Ed. Sherman is the manager of the St. Elmo, and Mr. Sam

Hosworth is the foreman. Six miners and four surface men are employed on the mine. The main shaft is down 400 feet, 100 feet of which was sunk during the present year. The equipment is a steam engine, round cable and cage. The company has several claims that will be developed from the lower levels secured by this shaft.

THE BUTTE-AMAZON COPPER COMPANY.

Mr. Charles Mattison is the superintendent of this property, and is employing six miners and three surface men in the sinking of a development shaft, which is being put down in a large ledge, and from the lower levels attained adjoining claims will also be explored. The shaft is equipped with a steam hoist, cable and bucket.

THE BUTTE-MICHIGAN MINING COMPANY.

The main shaft is a 2-compartment that has been put down 200 feet during the present year. The shaft is timbered with 12x12timbers and is equipped with an engine, cable and bucket. The company has a large tract of land that will be developed from this shaft.

The State of Montana.
Office of State Mine Inspector.
Wm. Walsh.

Helena, Mont., Oct. 10th, 1906.

Sir:

Section 586, Political Code of Montana, among other things, says:

“Upon receiving notice of a serious or fatal accident, the inspector in person, or the deputy, must at once repair to the place of the accident and investigate fully the cause of such accident, and where possible to do so, the inspector or deputy inspector shall be present at the coroner’s inquest held over the remains of the person or persons killed by such accident, and testify as to the cause thereof, and state whether, in his opinion, the accident was due to the negligence or mismanagement of the owner or person in charge.”

Section 49, Political Code, laws of 1901, Senate Bill No. 106, after enumerating some of the duties of the Coal Mine Inspector, says:

“* * * and it shall further be the duty of the said coal mine inspector after being notified by a justice of the peace or coroner, in the district where accidents may occur, to immediately investigate the same.”

From the above it would seem that the coal and metalliferous mine inspectors would be obliged to attend and testify before the coroner's inquest whenever an accident occurs in their respective departments.

Several times during the past couple of years fatal accidents have occurred and the inquests have been held and verdicts rendered, without time or opportunity having been given for the inspector to be present to make investigation or to testify at the hearing.

Would the inquest be complete without the inspector's testimony?

Should not the coroner or acting coronor date the inquest so that the inspector could be present?

Could the coroner summons the jury, have the remains viewed and allow the body to be buried, and postpone the inquest until the inspector could be present?

An answer to the above inquiries by you would, if understood by the coroners and the inspectors, no doubt be of benefit to both offices and save trouble and expense to both counties and state.

Respectfully yours,

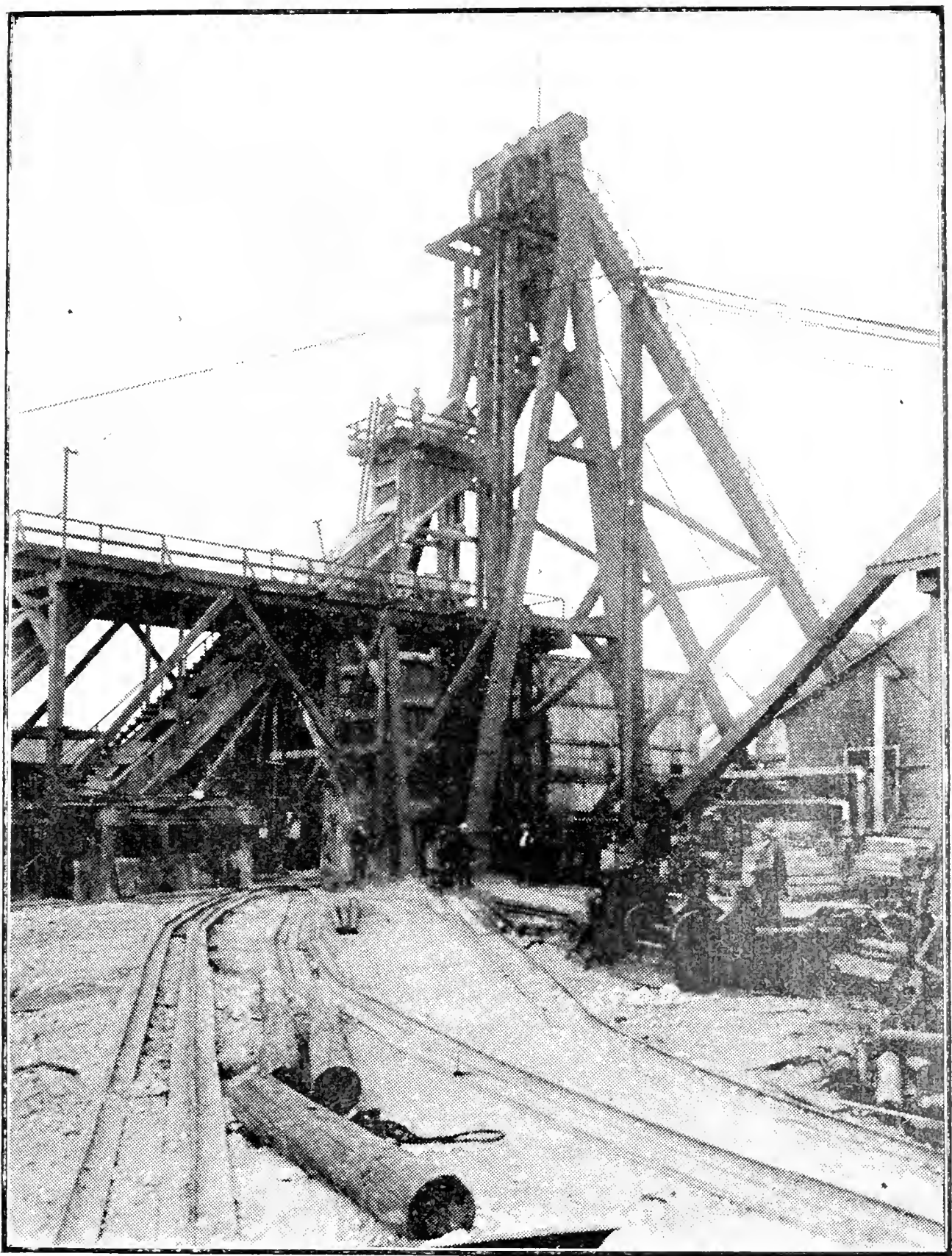
WILLIAM WALSH,
Mine Inspector.
J. B. McDERMOTT,
Coal Mine Inspector.

ALBERT J. GALEN,
Attorney General State of Montana,
Helena.

Helent, Mont., Dec. 1st, 1906.

Mr. J. B. McDermott, Coal Mine Inspector; Mr. William Walsh,
Mine Inspector, Helena, Mont.
Gentlemen:

Your joint letter of recent date received, in which you request



RARUS HOIST, BUTTE

an opinion of this office as to the duties in regard to cases where fatal accidents occur in any of the mines under your respective jurisdictions, and also as to the duties and procedure of coroners and acting coroners in such cases.

Section 586 of the Political Code, as amended by the laws of 1903, page 181, in defining the duties of the mine inspector, says:

"Whenever a serious or fatal accident occurs in any mine it is the duty of the person in charge thereof to immediately notify the Inspector of Mines or the Deputy Inspector, and upon receiving such notice the inspector in person or the deputy inspector must at once repair to the place of accident and investigate fully the cause of such accident, and whenever possible to do so the inspector or deputy inspector shall be present at the coroner's inquest held over the remains of the person or persons killed by such accident, and testify as to the cause thereof, and state whether, in his opinion, the accident was due to the negligence or mismanagement of the owner or person in charge."

Section 4 of Senate Bill 106, laws of 1901, page 64, in defining the duties of the Coal Mine Inspector, says:

"And it shall further be the duty of the said Coal Mine Inspector after being notified by a justice of the peace, or coroner, in the district where accidents may occur to immediately investigate the same."

From the language of the above laws it is apparent that the legislature intended that said mine inspectors would make personal investigation into the causes of death in mines coming under their jurisdiction, and give to the coroner and coroner's jury the benefit of their opinions as experts upon the facts found by their investigation.

Said section 586 as amended says:

"When possible to do so, the inspector or deputy inspector shall be present at the coroner's inquest held over the remains of the person or persons killed by such accident and testify as to the cause thereof."

If the location of the mine is so remote from the office of the inspectors, or the place where the proper inspector may be then engaged as to make it impossible for him to go to the mine and make his investigation before the body of deceased should be interred, then and in that event, the coroner or acting coroner should impanel the jury and after they have inspected the body or bodies, he should not conclude the taking of the testimony

and submit the case to the jury until such time as the proper mine inspector had received reasonable notice and had opportunity to make his investigation and testify before the jury.

The coroner or acting coroner has the right after having had the jury inspect the body or bodies, or at any stage of the proceedings thereafter, to adjourn the inquest to some future date so as to give the mine inspector time to go to the place of the accident, make his investigation and then appear before the jury and give his testimony.

In our opinion this procedure should be followed by coroners and acting coroners in all inquests held by them over the remains of persons killed in mines coming under the jurisdiction of such mine inspector.

Very truly yours,
ALBERT J. GALEN,
Attorney General.

